THE IRON AGE

New York, September 6, 1923

ESTABLISHED 1855 VOL. 112, No. 10

Savings Effected in New Radiator Plant

Emphasis on Minimizing Numbers and on Special Skill of Workers Has Resulted in Equipment and Design of Unusual Originality

BY M. C. LIPPITT

FOUR ideas have motivated the general and detail plan gradually being consummated at the plant of the Republic Boiler & Radiator Co., in Woodberry, Baltimore, Md. The plant is located in a section of the country where the absence of radiator plants would necessitate the expense and inconvenience of importing all experienced labor, and to many this would seem an insurmountable difficulty. The solution of this problem can lie only in some method of manufacturing radiators by unskilled and inexperienced labor; and in the application of such a method there is not only the saving effected by the employment of less costly help but also the virtual elimination of the constant labor turnover expense.

With the possibility of minimum wage rates being established, the second aim was to bring the number of employees down to a minimum. Labor-saving machines, combined with an efficient plan of production eliminating all waste motion, were the logical solution of this problem.

A natural desire of a new concern is the minimizing of equipment costs. To achieve this end it is necessary so to plan the equipment that not only will the usual initial outlay be reduced, but also the expense connected with the upkeep of and addition to the original installation. Provision for future expansion is becoming recognized more and more as a necessity in the design of new factories, and to this end the initial plans may wisely extend far beyond the small unit with which it is often necessary to start.

The attainment of these four desirable features has been the aim of the Republic Boiler & Radiator Co., and what success has been achieved may be judged from the following description of the method of operation employed in the Baltimore plant.

The first operation in which the advantage of inexperienced help appears is in the making of cores. Prepared core sand is fed from an overhead bin in a uniform supply into pairs of pans carried by an horizontal conveyor beneath the bin. The weight of the sand as it drops from the height of the bin packs the sand, and the pans pass immediately under three strike-off bars which are at different heights and angles, the last one being the proper height to make a complete strike.

Traveling on Rails at a Speed of 5 In. per Min., a Combination Sand Cutter and Molding Table Leaves Molds Stacked Three Deep in Its Wake

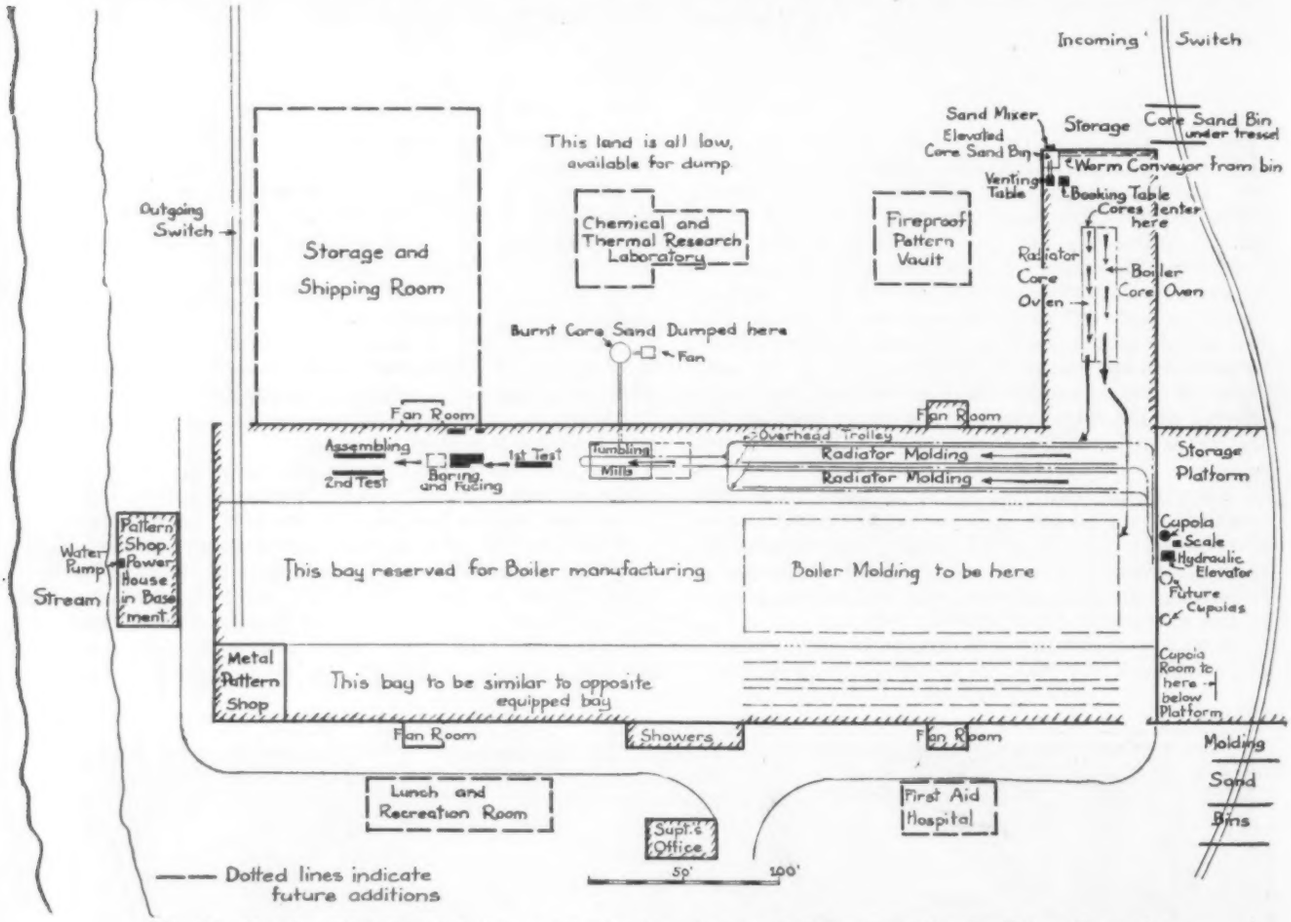
The conveyor deposits these pans in pairs on a venting table, where, by means of a small foot-operated hydraulic lift, one pan is pressed upward against a venting plate which, by leaving its imprint in the sand, forms the required vent. The pair of pans is then removed to the booking table, where a closing device operating like the closing of a book by a second small foot-operated hydraulic lift brings the two halves together. The closed core is moved to the opposite side of the booking table, where a third small foot-operated hydraulic lift raises the top pan without jarring the core. The core is then ready for the oven, and it may easily be seen that, with a few moments of instruction, green help can efficiently perform the important operation of core-making.

The molding operation is accomplished with almost as little skilled labor. A combination molding turntable and sand cutter starts at one end of the molding floor, where the sand lies just as it has been left after the previous shaking out. The car is on tracks 9 ft. apart, and the sand is between the tracks, extending for a length of 200 ft. for each floor. The car, motor driven, moves 5 in. per min., and as it moves revolving paddles at the front of the car cut the sand and throw it to the center, where it is elevated by a bucket conveyor. The sand is dropped into a gyratory sieve from the bucket elevator, and is sieved into a hopper, the bottom of which is the size of the flask used.

The turntable on the car has four stations, at each of which one operation of radiator molding is performed. A pair of metal patterns is bolted to matched plates at each station. Chaplets are entered in patterns and flask is put in place at the first station. The second station places the flask directly under the sand hopper. A lever operates the shutter bottom of the hopper, allowing the required amount of sand to drop into the flask. At the third station the sand is rammed, and at the fourth the mold is lifted by a foot lever and placed behind the car, one end resting on the car rail to give the proper angle for pouring. Inasmuch as the molds are stacked three deep, the completed molds for a day's work will just comfortably fill the 200-ft. length.

Every effort has been made to eliminate unnecessary and superfluous motion. The handling of raw materials which, in the radiator business, are of necessity heavy and bulky, involves the first saving in number of employees. The incoming switch, which bears all raw materials, is elevated above the plant floor level, and passes over core and molding sand bins into which sand may be dropped directly from hopper-bottom cars. The core sand bin is located near the end of the core room, a generous storage space intervening between it and the point of distribution of the sand. Two-wheeled carts are filled to measure the batch, and these are dumped directly into the sand mixer, which is lowered to a convenient height. The mixer is located immediately outside the building and a chute from the point of discharge through the building wall allows sand to slide into the boot of a bucket elevator within the building. This elevator delivers the sand to the overhead storage bin from which, as has been described, core pans are filled.

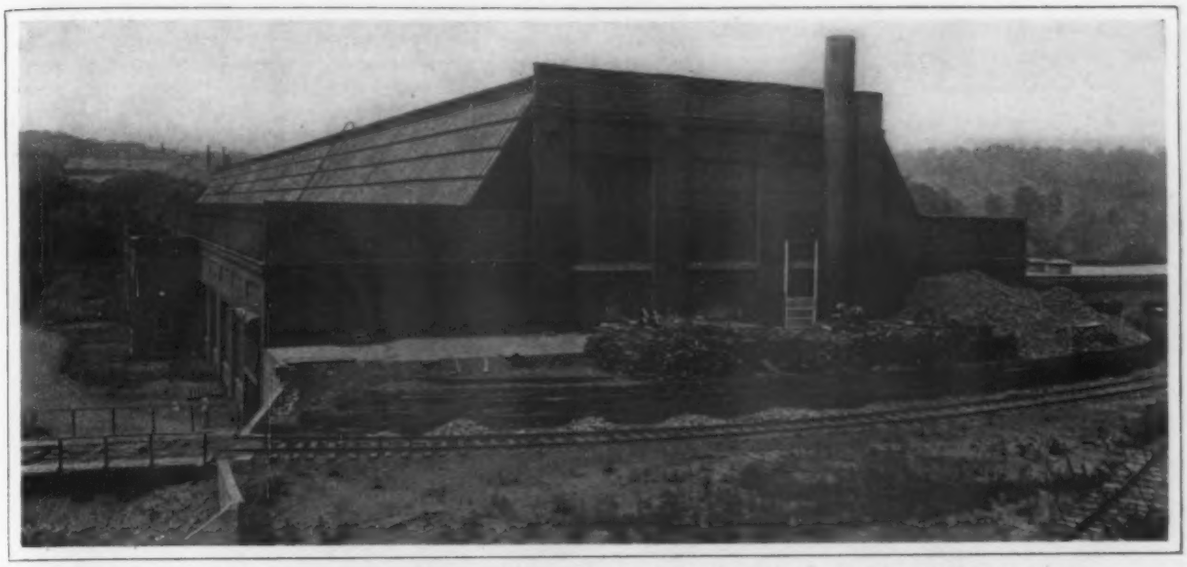
Molding sand is stored in similar bins at the opposite end of the plant where it may be conveniently wheeled into the foundry.



Besides Showing Method and Scheme of Production, the Plan Indicates Provision for Future Expansion

Midway between core sand and molding sand bins the incoming track passes the cupolas at a distance of about 40 ft. The platform to which materials are unloaded extends the full width of the main building, and it is at a height to be in line with the floor of cars on the track. Iron and coke are easily unloaded by gravity conveyors run from the floor of the car to almost any point on this large storage platform. This same platform, being sufficiently elevated above the plant floor line, is the charging platform height, and iron and coke, in made up charges, are moved from storage directly to the charging doors of the cupolas via an adjacent scale. Gates and sprues to be remelted are deposited close to the charging doors by means of a hydraulic elevator from the plant floor below.

The same economy displayed in the handling of raw materials has been applied to the general plan of pro-



The Railroad Siding at the Cupola End Allows for Direct Delivery of Materials to the Elevated Storage Platform and Passes Directly Over Sand Pockets. One Shown at Extreme Left

duction. With, of course, the exception of the charging platform, all operations are at one floor level and virtually under one roof, and movement is in a direct line toward the storage room.

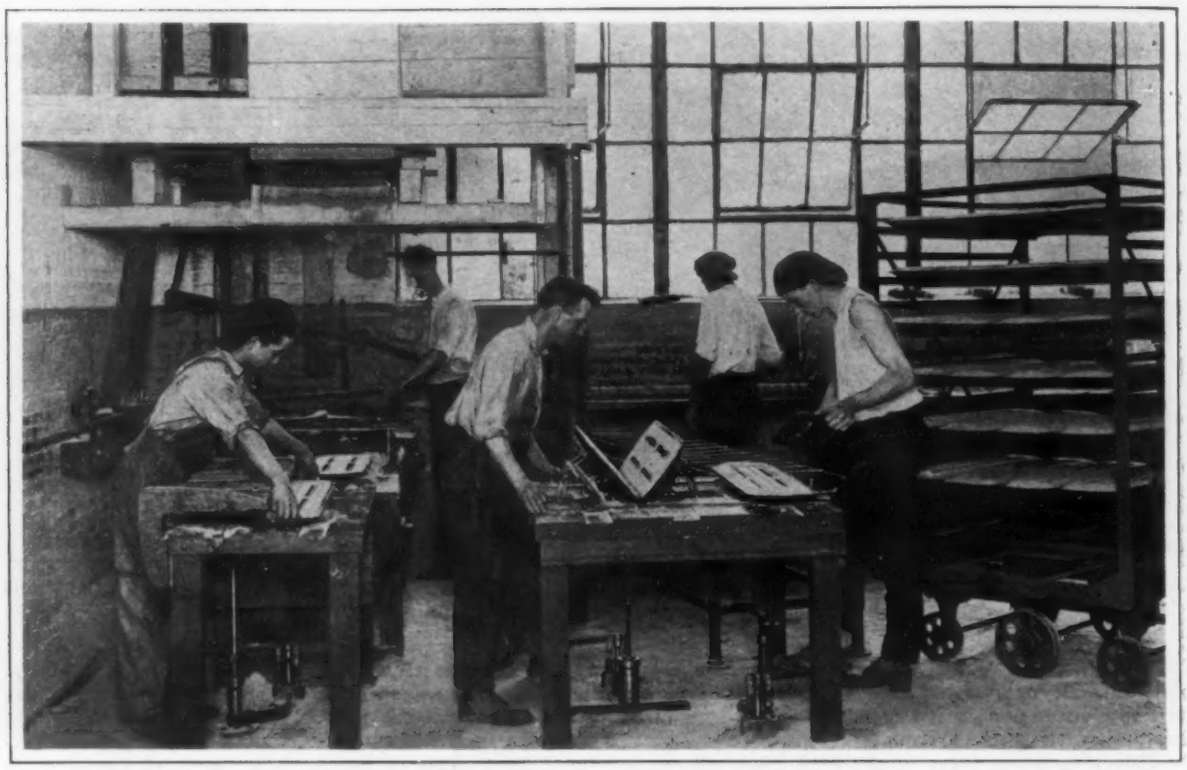
This idea takes form in the core room where, instead of numerous small ovens, there is one long, continuous oven, into the far end of which the green cores are entered, and from which, at the end adjacent to the foundry, baked cores emerge. Not only does this conform to the straight line production plan, but it greatly increases the ease with which the cores may be watched and practically eliminates the possibility of burning. The oven, furnished by the Gehnrich Indirect Heat Oven Co., is equipped for both gas and coke, gas being very practicable on account of the low rates prevailing in Baltimore. The heat travel is in a direction opposite to that of the core cars; so that as the core cars advance the temperature to which they are exposed increases, and the moisture from green cores is carried off away from the more nearly baked cores. Since cars must enter one at a time at one end, they emerge one at a time at the opposite end; and when one car is ready for removal, all cars behind it have been in the oven for a shorter period of time than this first car. Therefore, there is no danger that any of the others may have been baking too long. And obviously, though there be twenty cars in the oven, it is only necessary to watch the one which will emerge first.

The straight path of production prevails also in the foundry. The cupolas are located at the end of the main building, and molding operations extend about half way down the length of the building. Overhead trolleys furnished by the Louden Machinery Co. facilitate the pouring of iron by following each line of completed molds. Overhead trolleys, small platform trucks, and gravity conveyors enable the castings to be handled with ease from the molding floor to each of the successive operations, the last of which locates the finished product, without having touched the floor, at the other end of the building from the cupola, whence they are removed for storage and shipping. Plans include a large shipping and storage room as a wing at the end where the product is finished. The outgoing switch runs close to this, and is at a height to bring the car floor on line with the shipping room floor.

Each operation has been planned with the aim of reducing labor to a minimum. The sand cutting process, always long and tedious when done by hand, is entirely eliminated, as has been shown, by the sand cutting molding table. The shaking out has been facilitated by the use of loose pins in the flasks.

Tumbling barrels, made by the Kennett Square Foundry & Machine Co., are used for cleaning, and these are located in a covered pit which brings them to a convenient height. The overhead trolley facilitates the carrying of castings to be tumbled. The mills are square so as to fit the shape of the tier of castings which goes into each, and the fact that they operate

This View of the Republic Radiator Plant Shows Core Room at Extreme Left and Power House at Right

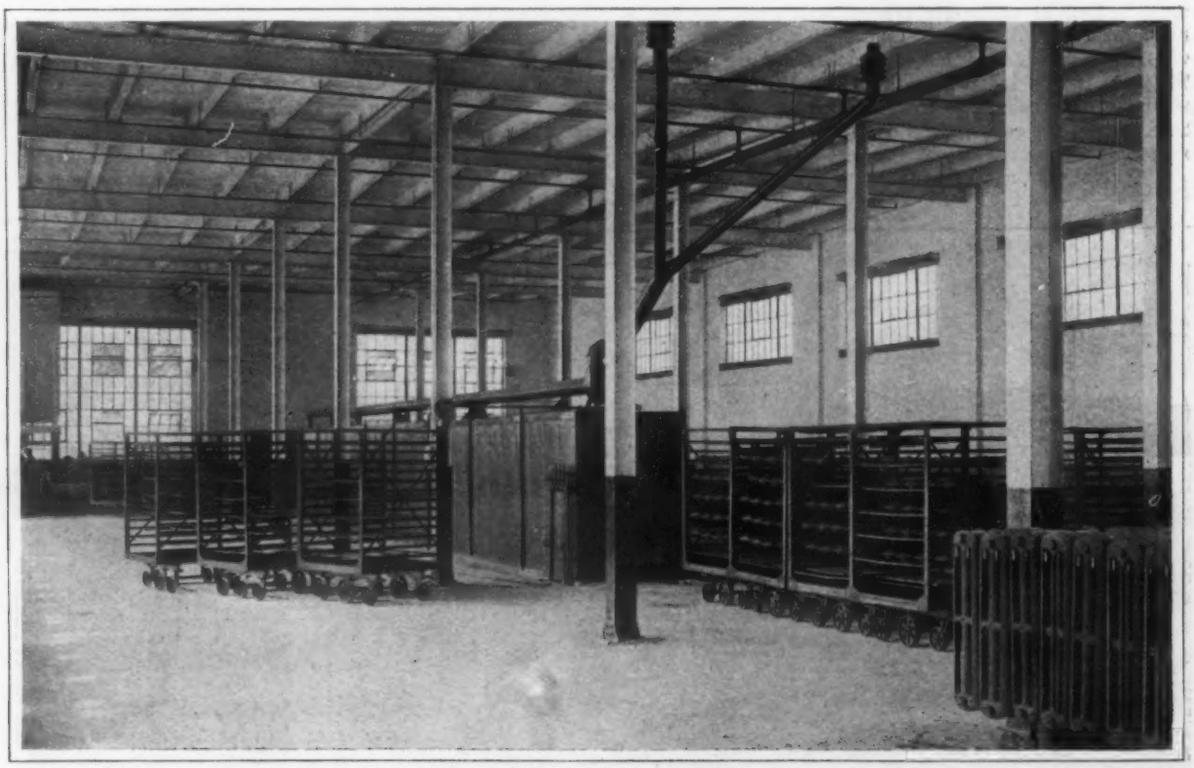


In a Simplified Process of Core-Making, Sand Falls from the Bin into Core Pans, Which are Hidden by Strike-Off Bars. One pan, filled and struck off, can be seen emerging from last strike-off bar

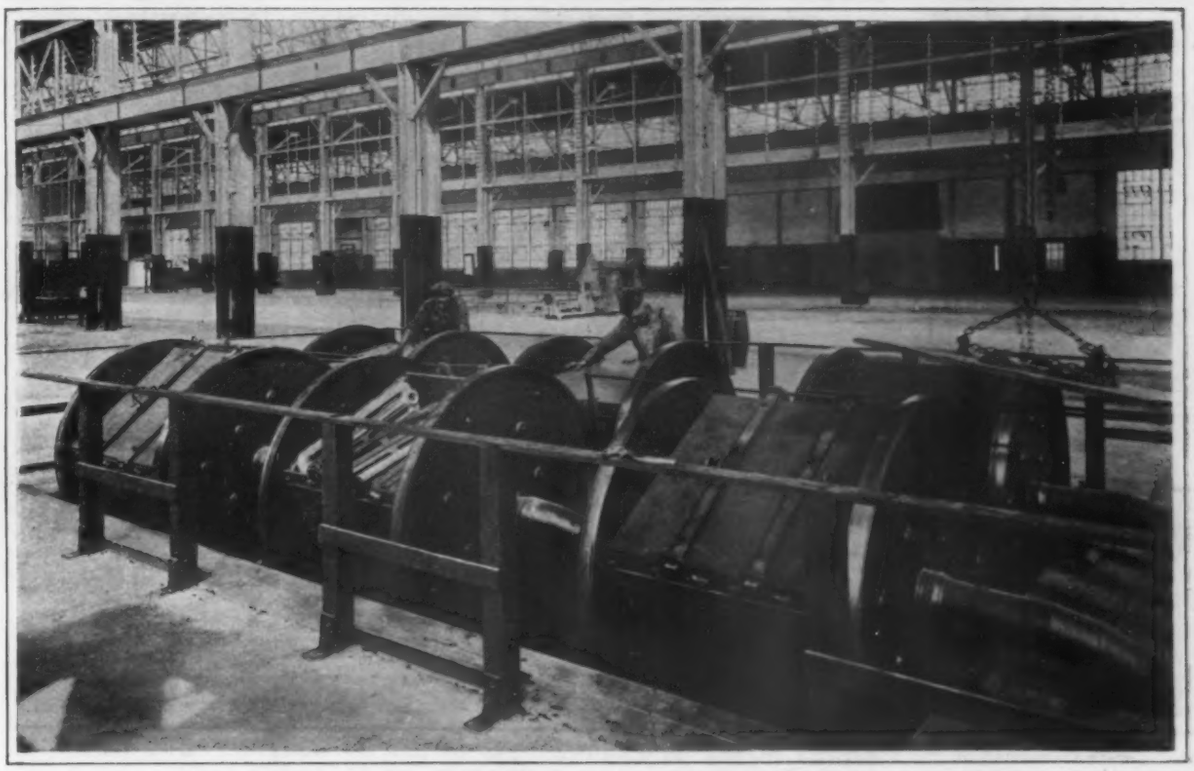
on rollers without any gears make them comparatively noiseless. An exhaust system, furnished by the Dixie Mfg. Co., and connected to each mill, not only keeps the mills dustless but also removes from the castings burnt core sand, carrying this with the dust under the floor to a dumping point at some distance from the plant.

Individual castings are tested by hydrostatic pressure. The outlet at the top through which the water must rise, instead of being open, is connected to an inclosed air chamber of proper size to contain all of the air in the casting. When the water is turned on at the bottom of the casting, air is compressed into the chamber above, leaving the casting full of water. This not only eliminates the nuisance of overflowing water, but it adds the pressure created in the air chamber to the weight of the water, causing the casting to be quickly emptied after the test.

The special boring and facing machine has been designed to receive castings in a vertical position. Castings are more conveniently handled in this position, and time is saved thereby. The eight tools used for the



Core Room Has a 75-Ft. Oven with Exhaust Pipes, Which, by the Aid of a Suction Fan, Carry Off Gases and Smoke Through Ventilators in Roof



In Line with the Molding Floor Are the Tumbling Barrels Set in a Pit for Convenient Handling of Radiator Castings and with Exhaust Pipes as Shown

operation may be separately or simultaneously adjusted, saving the possible loss in castings caused by lack of proper adjustment between facing and reaming tools.

The assembling machine is operated by hydraulic pressure, and is so designed that both heads move toward each other, cutting in two the time required when only one head moves.

Because the plant is located in a settlement of working people, it is not difficult to secure and retain desirable labor. Still there are numerous advantages which emphasize the desirability of working in this particular plant. Built by the Government just before the close of the war, the building has unusual attributes in the way of head room, producing a superabundance of light and splendid ventilation. Not only is there an adequate heating system for cold weather whereby heated air is blown into the building, but in summer the same fans can supply cool air when needed, since the coils over which they blow contain cold water. The foundry is thus quite comfortable in the most extreme warm weather.

All equipment was designed and purchased with the view of keeping both initial and upkeep costs low. Steel flasks made by the Truscon Steel Co. are used

Next Beyond the Tumbling Barrels Are the Stands for Hydraulic Testing of the Radiator Sections

Radiator Is Completed on the Assembling Machine. In the distance may be seen the boring and facing machine, the testing stand, the tumbling barrels and finally the molding floor

exclusively. While the original price of these is somewhat high, it was estimated that their wearing qualities render them more economical in the end. The stacking of the molds three deep reduces the required number of bottom boards and top plates, which are also of steel.

Molding table, testing machine, boring and facing machine and assembling machine are from original design and built by the Republic Boiler & Radiator Co. Since all patterns for these belong to the company they can be duplicated at a relatively small cost.

Cranes, hoists, industrial railways and such handling apparatus have been replaced by methods which employ gravity whenever possible and involve very little equipment. A large expense item is thereby eliminated.

No core removing equipment is required, since the exhaust system which carries away the dust from the tumbling mills disposes also of the burnt cores. Expensive wear on the fan used for this exhaust system has been prevented by the particular design of the system. The fan creates a very strong suction, which draws the sand from the castings, but by the use of a separator the sand is dumped automatically before it reaches the fan.

Pattern equipment for the production of radiators is always a large item. Here each pattern is bolted to a jigged aluminum plate which fits on the turntable. Obviously this eliminates expensive match plate equipment. Also on account of the use of the molding turntable, the molding process is so divided as to make the number of patterns required per man much less than in piece work. This results naturally in a considerably reduced pattern equipment.

Inasmuch as all castings are submitted to a hydrostatic test at least twice, the water consumption is very large. An inexhaustible supply is furnished by a pump

Special Boring and Facing Machine, in Which Casting Is Placed in Vertical Position and Tools Approach Casting on Both Sides

connected to a stream flowing adjacent to the plant. By the use of this water not only have water bills been greatly reduced but the need of settling tanks and such expensive equipment, required when the metering of all water renders it desirable to use again the sand laden testing water, is obviated. Indeed, the cost of water for other than drinking purposes has been so reduced by taking advantage of this stream that the operation cost of the hydraulic elevator to the charging platform is negligible.

Only a small part of the plant of the Republic Boiler & Radiator Co. is now employed; but its present capacity may be quadrupled without change in the original layout. Of the three bays in the main building the two outside bays will be used for radiator molding while the center will be reserved for boiler molding. Foundations for two additional cupolas were installed with that of the first.

Likewise in the core room, a pit which provides for the burning of coke under a future second core oven (which will be for boiler cores) was put in at the time the first oven was built. Here also care has been taken to provide a core sand supply for greater future needs. A worm conveyor from the core sand bin will deliver prepared sand to any point at the back of the core room. A second radiator core-making apparatus may be installed at any time the need arises.

Provision has been made for additional tumbling mills to complete the requirements of the full capacity of the first bay; likewise two or three more boring and facing machines all driven from the present motor location may be added. The testing stand is built for the doubling of its present capacity by the equipping of additional stations.

There is sufficient unoccupied property adjoining the plant to allow of unlimited additions to the present plans.

The method of manufacture and all equipment were designed by the company's general superintendent, William C. McKeown.

ELECTRIC STEEL IN CHINA

Only One Furnace Operating—Steel Casting Prices and Imports—Costs

The use of the electric furnace in the steel industry of China is discussed by L. W. Hoyt in a long article, "China's Iron and Steel Industry," in the London *Iron and Coal Trades Review* of Aug. 3 and 10. He says in part:

At present there is only one electric steel furnace in China proper. This is installed in the foundry of the Kiangnan Dock & Engineering Works at Shanghai. An electric furnace is operating in the British colony of Hongkong, but, strictly speaking, there is not today a single steel foundry in China—either Bessemer, open-hearth, malleable or electric.

The only city in China where an electric furnace (either ferrous or non-ferrous) could be profitably operated at the present time is Shanghai. This city has greatly increased its municipal supply of electric power, and the international settlement power house at Shanghai is as modern and efficient as any station in the world. The cost of electric power to large users of current is low. Power is delivered to cotton mills in Shanghai at less than 1¼ gold cents (0.625d.) per kwhr.

Electricity is supplied on what is known as the "bulk" system of charging, whereby two separate and distinct charges are made. These charges are known respectively as the "capital charge" and the "running charge."

The capital charge is based upon the amount of capital which the Shanghai electricity department has to expend in order to meet a definite demand. This naturally varies to some extent with location of such demand in relation to the position of the municipal generating station.

The running charge is based almost entirely upon the actual cost of generating energy, and is naturally greatly influenced by the cost of fuel for the time being in force. To meet this variable factor a basic charge per kilowatt-hour is made, based upon the assumption that fuel can be purchased at a cost of 1.6 gold cents (0.8d.) per 100,000 B.t.u. In the event of this assumed cost being either greater or less than the figure given, then a proportionate increase or decrease in the basic running charge is made effective. The equity of this arrangement will be apparent when it is borne in mind that the cost of fuel is outside the control of the municipal authorities.

The cost of power in electric furnace practice in America usually constitutes one-third the cost of the steel in the ladle. Under conditions obtaining at Shanghai a very accurate estimate of electric hot-metal costs can be made, as nearly all materials entering into these costs have a known value in Shanghai, although none of these materials have ever been utilized in steel foundry practice there.

Let us assume that a 3-ton acid electric furnace is to operate in Shanghai, and that a rate of 1 1-7 gold cents (0.5715d.) per kwhr has been contracted for from the city electricity department. With this assumption the figures given below have been deduced from what are known values for the scrap alloys, refractories and labor necessary to place an electric heat in the ladle. Electrode costs cannot be quite as accurately estimated, because no electrodes have hitherto been imported into China:

6000-Lb. Charge (Figures in Net Tons)

Materials	Price Per Ton	Consumption, Lb.	Cost per Heat £ s. d.
Plate scrap, 35 per cent.....	£ s.	1,500	3 6 0
Punchings, 10 per cent.....	4 4	600	1 1 8
Axle turnings, 25 per cent..	3 12 (local)	1,500	2 15 0
Operating scrap, 40 per cent	3 12 (local)	2,400	4 15 0
Loss, 4 per cent.....	3 19	240	0 6 6
Ferromanganese	0 2	50	0 7 8
Ferrosilicon	15 2	25	0 2 8
Aluminum	14 0	5	0 4 6
Ganister	77 12	150	0 4 0
Silica sand	.. ..	50	0 4 0
Electrodes	.. ..	65	1 6 0
Brick	40 0	....	0 6 6
Ladle drying	.. ..	....	1 0 0
Electricity	0.5715d. per kw-hr.	1,800 kw-hr.	4 2 4
Labor	.. ..	....	0 4 0
Laboratory expense	.. ..	....	0 6 6
Total per heat.....	.. ..	6.585	20 12 4
Total per net ton.....	.. ..	....	6 17 6

The Chinese are excellent pattern-makers and molders, and have been used to iron foundry work for generations. There is every reason to suppose that they would, with capable supervision, readily and efficiently grasp the details of steel foundry operations. Electric steel can be melted in Shanghai as cheaply as in most cities of the world, and owing to this steel's freedom from oxygen it would be the kind of metal best suited to Chinese practice.

A great advantage in the Chinese market is the high price for finished steel castings. Prices for steel castings in Shanghai range from 1s. to 1s. 3d. per pound, and where emergency work is required even higher prices could be demanded by a steel foundry located there.

The Chinese customs returns do not show steel castings as being a product of much value in imports. These customs statistics, however, do not go into detail, and while thousands of tons of steel castings enter China each year, they are grouped for the most part under the general term, Machinery.

In a test in Glasgow to determine acid resistance, Monel metal gave better results than the other materials used, which included, in order of their resistance, Monel bronze, nickel bronze, phosphor bronze, aluminum bronze, etc., etc., with mild steel at the bottom of the list. Jets of bad feed water were directed upon disks of the materials tested for 500 hr. and judgment was by appearance.

Lungyen Blast Furnace Plant Near Peking

Power Plant Equipment and Use of Furnace Gases— Special Settling Arrangements Needed to Avoid Trouble from Loess in the Water Supply

BY K. E. HUMBERT*

A GAS main 4 ft. in diameter continues to the boiler house, which is 46 x 114 ft. and 35 ft. 8 in. high, of steel construction, with corrugated steel roof and siding. The roof is of the offset monitor type. Five Wickes vertical water tube boilers in 500-hp. units are installed, designed to operate at 200 lb. pressure and 165 deg. superheat. Power Specialty Co.'s Foster superheaters are used. The boilers are gas fired, with the Beaton type of gas burner.

Particular care has been taken, in the design of the boiler house gas piping that units may be taken off without gas leakages into the house. A bleeder is provided at the end of the gas main, removing excess gas to the outer air. Grates have been provided for alternative coal firing. There is a self-supporting steel stack, 6 ft. 6 in. inside diameter and 150 ft. high, brick lined, for each pair of boilers. Flues are underground. The blow-off lines are led in a trench to one end of the house, where they exhaust into a blow-off tank.

Other boiler house equipment includes Stets feed water regulators, Golden-Anderson triple-acting non-return steam valves and Everlasting blow-off valves. There is a complete series of platforms, suspended from the roof trusses, making all points easy of access for the operators. Trap doors in the roof over each boiler, with a walkway on the roof extending the length of the boiler house, simplify the work of removing or replacing boiler tubes. The 8-in. feed water line from pumps in the power house, and the 12-in. steam line to the power house, are in an underground trench.

Outcrop of Ore, Showing Formation as Well as Ease of Working

Of steel construction, the power house has brick walls and corrugated steel roof. It is 50 x 120 ft. and 28 ft. high from the operating floor, which is 8 ft. above yard level. For supplying the blast there are two Ingersoll-Rand turbo-blowers designed to operate with steam at 175 lb. pressure and 150 deg. superheat. Each has a capacity of 28,000 cu. ft. of air per minute at 12 lb. pressure or 25,000 cu. ft. at 16 lb. When (and if) the size of the furnace is increased it is only necessary to change the steam nozzles to secure the larger amounts of blast required.

There is a separate 30-in. diameter air intake for each blower, extending above the power house roof, and with a connection allowing the air to be drawn from inside the house, this provision being necessary on account of severe dust storms at times. The air regulating device is the single Venturi type. Ingersoll-Rand multiport check valves are installed in the discharge line from the blowers. The cold blast main leads through the boiler house directly to the stoves.

All electric power required at the plant is direct current, generated by two General Electric 250-kw. 150 r. p.m., 250-volt, self-excited, direct current 3-wire generators, driven by 20 x 32-in. Nordberg-Todd unaflow engines. The engines operate non-condensing, but condensers may be added if desired.

For the Ingersoll-Rand turbo-blowers there are two C. H. Wheeler Mfg. Co. low level jet condensers maintaining a 28-in. vacuum. Condensers and their auxiliaries are located in the basement. Condensing water is taken from a sump in the basement, which in turn is supplied from the plant reservoir. The discharge water returns to a hot well at the plant reservoir. Other units in the power house basement include two Worthington 20 x 12 x 15-in. horizontal duplex pot-valve type boiler feed pumps, a Richardson-Phoenix continuous oil filter system and a 150 cu. ft. per minute Sullivan Machinery Co. air compressor, with receiver. The feed water meter is of the Venturi type, installed in the discharge line from the pumps. A register indicator-recorder is placed on the operating floor.

All equipment of the power house except turbo-

*With Perin & Marshall, consulting engineers, New York. This is the third and concluding installment of a story on Chinese blast furnace developments. The first part appeared Aug. 23, page 461; the second, Aug. 30, page 534.

Changchunlin Limestone Quarry, with a Native Lime Kiln in Left Foreground. The high peak in center is almost solid limestone, furnishing a virtually inexhaustible supply

blowers and power units is in the basement and all steam and water lines are kept beneath the main floor, resulting in a very finished appearance. All steam and water lines enter or leave by underground concrete trenches. A 10-ton hand-operated crane facilitates maintenance work. Particular attention was paid to the number and location of stairs leading from operating floor to basement.

Electric distribution is underground from the power house to a steel main distributing tower. From this tower the lines are carried on a reinforced concrete pole system to the various units. The plant lighting system is of the 3-wire 115-230 volt type. Yard lighting has been given as careful consideration as the internal lighting of various units.

Using Muddy Water

The water system required considerable study, as unusually severe conditions had to be dealt with. It may be divided into three subdivisions: river pump house and settling basins; main or 60,000,000-gal. reservoir; and the plant reservoir, pump house and distributing system. The Yung Ting River is the source. Ample water is available, but has the great disadvantage that it carries a large amount of loess as suspended matter. The presence of this loess is what gives the rivers of China their characteristic yellow appearance.

At certain times the loess content is as high as 50 per cent of the total, and it is impossible to use the water. Therefore a storage reservoir was required to tide the plant over such periods. The river pump house contains two 2500 g.p.m. 70 ft. head Cameron pumps, driven by 75-hp. motors and primed by means of a Wheeler rotrex vacuum pump. The river intake had to be especially designed to provide for removal of the settled loess, the water being pumped to a system of gravity settling tanks.

One favorable feature in this connection is that the loess settles out rapidly, tests showing 98 per cent had settled out in 4 hr. Water is pumped in and allowed to stand until settled, before it goes by gravity flow through a buried concrete flume to the main reservoir. Valves are then opened and the settled loess is flushed back into the river.

With the installation of the large 60,000,000-gal.

Another View of Changchunlin Quarry and a Native Kiln. Small limestone mixed with coal is put in layers 8 in. thick between layers of lump, to form a short cylindrical mound. Larger lump stone is laid as a wall around the outside and the whole held with ropes. The shell does not burn the ropes, nor is it burned to lime. The ashes finally are sifted out

Native Coke Ovens of the Lu ho kou Coal & Coke Co. near Fenglochen, 448 Miles North of Hankow on the Peking-Hankow Railroad. The ovens are 12 to 18 ft. diameter and about 8 ft. deep, with walls 2 ft. above ground. Coking is done in an 18-day cycle, one ton of coke being recovered from 1.8 tons of coal.

reservoir the river system may operate at the most favorable periods, but with the plant water supply assured. The main reservoir has been designed in part to work in with the plant system. It is built so that a gravity flow results to the smaller plant reservoir. A hill was utilized for one side, and three sides were built, with walls 20 ft. high, 10 ft. wide on top, and 90 ft. wide at the bottom. A 15-ft. depth of water is maintained in this reservoir.

The warm cooling water from the blast furnace and stoves is led to a far point in this reservoir and the water from the jet condensers in the power house is sprayed here also in a 4000-g.p.m. Yarnall-Waring spray system. The shore operating levers of this system are a particular advantage in this case. A 20-in. cast iron pipe carries the water from the main reservoir to a 500,000-gal. plant reservoir. A float operated valve in the line at this plant reservoir maintains a predetermined water level, governed also by an overflow.

The plant pump house is at one end of the small reservoir, out of which the general water service pump suctions lead. Two 2000-g.p.m. 128-ft. head Cameron pumps are provided for this purpose, driven by Moore steam turbines. They pump into a 110,000-gal. water tower furnished by the Chicago Bridge & Iron Works, which supplies the general water system, but a by-pass provides for pumping direct into the system. From the water tower the main line leads to the blast furnace and stoves. This water on its return may go to the small reservoir or to the main reservoir. Outlets at the furnace and stoves are sufficiently high so that it returns by gravity to either place.

The condenser supply water has an independent line from the plant reservoir to the sump in the power house, thus preventing any failure in supply. The discharge water from the condensers as well as turbo-blower cooling water returns to a sump in the small reservoir, from which two 4000-g.p.m., 70-ft. head Cameron pumps, handling water at 110 deg. Fahr. and driven by Moore turbines, pump it to, and through, the spray system in the 60,000,000-gal. reservoir.

The plant pump house building is of brick and concrete. In addition to the pumps it houses a Sorge-Cochrane hot water process water treating plant for treating boiler feed water. Exhaust steam from the power units and feed pumps in the power house, and from the pump turbines, is utilized for heating the feed water, after which it is treated, filtered and run by gravity to the feed pumps. Lines for general service water are taken off the water tower.

All pipe lines for live steam are insulated with 85 per cent magnesia, hot water and exhaust lines with air cell sectional insulation. Traps provided for the steam lines return a large part of the condensate to the plant reservoir. Water lines have been designed particularly to avoid pockets, and may be completely drained in case of shutting down the plant.

Open Pit Coal Mine at Fushun, 22 Miles South East of Mukden, Manchuria. These mines have been estimated to contain 1,200,000,000 tons of bituminous coal in seams from 78 to 480 ft. thick. Steam shovels are used extensively to dig coal and load cars, several drags of which appear at right center

Plant repairs and maintenance are handled in a complete machine shop. While at present the furnace product will be disposed of as foundry pig iron, it is the intention, as soon as conditions warrant, to produce commercial iron products. The designs therefore include a complete machine shop, pattern shop and foundry, with a common crane runway forming a storage yard between them. The machine and pattern shops have been installed in one building, but are separated by a fire wall; the runway and foundry will follow later. The building is of steel frame with brick walls and corrugated steel roof. It is 48 x 140 ft., with a one-story leanto housing the office, tool room and small tools, along one side.

In the machine shop proper are the large tools, including 36-in. lathe, 48-in. planer, 20-in. shaper, 5-ft. radial drill and 62-in. boring mill. A locomotive repair kit is also included. A 10-ton electric crane serves the shop and the storage yard, or may even serve the foundry. The pattern shop is of two stories, the working tools, which include 24-in. planer, matcher and molder, 24-in. rip saw, two 36-in. band saws and 16-in. wood lathe, being on the first floor. The second is reserved for pattern storage.

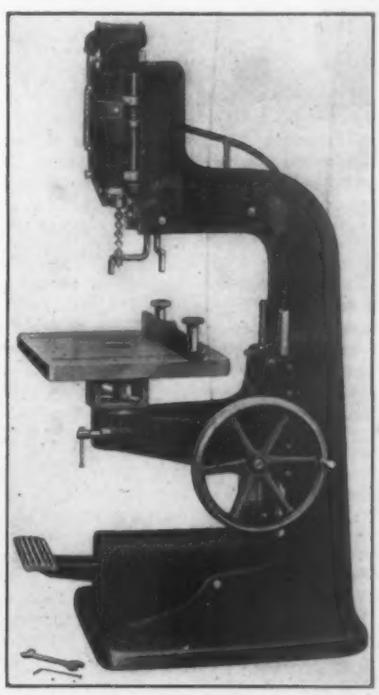
The foundry building, of steel construction with corrugated steel roofing and siding, is 48 x 100 ft. There is a leanto in which most of the equipment is housed, the main building being reserved for the casting floor. Equipment will include a cupola, capacity 6 tons per hour, with a motor-driven blower, core oven, molding machines, tumbler, etc. A standard gage track runs through the foundry, under the crane runway, and into the machine shop. There is also a 2-ft. gage industrial track connecting these units.

Construction has been under the management of the administration, with the services of a superintendent from the United States. Perin & Marshall, New York, have acted as consulting engineers for the administration. The work was carried on largely with Chinese construction equipment and with Chinese labor. This labor proved surprisingly capable of adapting itself to the kind of work involved and good progress resulted. There is a resident staff of Chinese engineers, most of whom were educated in the United States.

Electric Borer for Pattern Shops

A No. 72 single-spindle vertical borer with the rotor of the motor connected directly to the spindle of the machine, and having a blower also mounted on the spindle, has been placed on the market by the Oliver Machinery Co., Grand Rapids, Mich.

The motor-in-head arrangement is intended to eliminate belting, countershafts, pulleys and most of the bearings, saving floor space and decreasing the power required. The blower serves to blow the dust or borings away from the work. Because of its extra



The Machine May Be Moved About the Foundry By a Crane. Any size of mold may be rammed, the capacity being 10 cu. ft. of sand a minute

capacity, the machine is said to be especially suited to pattern shops, the distance from center of spindle to the column being 18 in., which is convenient for handling large or odd-shaped patterns.

The machine will bore up to 2 in. in diameter, 6 in. deep, with one stroke, and to the center of 36 in. Vertical movement of the table is 14 in. and the maximum stroke of the motor head is 6½ in. The table swivels completely around and tilts up to 45 deg. in any direction.

The motor housing consists of two halves bolted together and forming a unit with planed dovetailed ways at the rear. The motor stator is clamped concentrically inside of the two halves, air passages for adequate ventilation being provided. The rotor of the motor is keyed to the spindle running in ball bearings at the outer ends of the two halves. The lower half of the housing has a lug at the back through which a connecting link and a counterbalanced lever system reaching to the foot lever supply the downward motion of the head, a compression spring providing quick return. A stop lug at the right hand side of the housing operates between two adjustable stops for setting the length and position of the stroke.

The table, which is 20 x 24 in. and of cast iron, is finished at top as well as all four sides and bored for wood screws to fasten wooden tables or forms for special work. An opening at the center of the table permits chips to drop through and provides bit clearance. The knee which carries the table is gibbed to the main column in dovetailed ways and is moved vertically by means of spiral gears, square threaded screw and the handwheel at the right hand side of the machine.

The regular equipment includes motor, switch, fence on table, two hold-down fingers and five boring bits. The floor space occupied is 31 x 39 in., and the height is 72 in. The weight of the machine with regular equipment is 1200 lb., crated.

Malleable Castings in July

WASHINGTON, Sept. 1.—The Department of Commerce announces statistics on the production of malleable castings manufactured for sale, by months, based on reports received by the department. The figures for June are revised to include reports received since the preliminary bulletin for that month was issued. The returns include only those castings manufactured for sale as such and do not include those used in the plant or finished and sold as other products:

Production of Malleable Castings by Months

Month	Plants reporting	Total production, tons	Total shipments, tons	Orders booked, tons	Monthly capacity of plants, tons	Per cent of total capacity operated
May	90	64,726	62,802	52,898	91,174	71.0
June	100	65,168	64,608	42,067	96,240	67.7
July	103	57,881	60,102	41,723	98,241	58.9

Figures are also shown comparatively for May, June and July covering the operations of 88 identical establishments for which reports were received each month:

Comparative Summary for 88 Identical Establishments

Month	Total production, tons	Total shipments, tons	Orders booked, tons	Monthly capacity, tons	Per cent of capacity operated
May	62,273	60,465	50,470	87,698	71.0
June	58,440	58,072	36,240	87,357	66.9
July	50,111	51,783	36,252	87,585	57.2

Develops Gear Testing Machine

The American Grinder Co., 6534 Benson Street, Detroit, has placed on the market a gear tester for developing, checking and charting involute curves and testing tooth spacing. While intended primarily for ground gears, it is said to be used equally well on cut gears. The normal capacity is for spur, helical and bevel gears from ½ to 8 in., but spur gears up to 12 in. may also be tested.

The component elements of the machine may be noted from the illustrations. A transverse slide is mounted on a longitudinal slide, which in turn is mounted on the base. The slides are moved by means of handwheels shown, which have micrometer graduations. The gear to be tested is mounted on the stud seen at the left end of the base. A contact finger or needle and an indicator, by which the readings are taken, are mounted on the transverse slide as shown.

Gear Tester for Spur, Spiral and Bevel Gears. Arrangement for testing spiral gears is shown at right

In developing an involute curve for spur gears an adapter with base circle disk and steel tapes 0.005 in. thick are used. The adapter is made to the desired height and diameter, the latter being the diameter of the pitch circle times the cosine of the pressure angle. In taking readings the two tapes are tightened and the transverse slide and the handwheel, which is friction driven, is set at zero. The gage is used to set the finger or needle at right angles to the slide, after which the gear is set on the stud, with the indicator reading zero. If the tooth being tested is a true involute the indicator will remain at zero. The amount of deviation is shown on the indicator, and a chart may be plotted by using, as a basis, the handwheel graduations. A plunger provided automatically retards the handwheel every 0.010 in. The true involute will give a straight line on the chart and modified curves give concave or convex lines.

Tooth spacing is checked by using a fixed contact finger clamped to the slide in connection with the indicating device and 90 deg. spacing is checked by means of the set-up shown in the right-hand illustration. The indicating needle may be reversed in cases where it is impossible to reverse the gear. When it is desired to maintain a master curve or duplicate an established form, the longitudinal slide is used, first plotting the master and then checking the other gears with the chart. By making spiral adapters spiral and bevel gears may be checked for spacing and contour.

Consisting almost wholly of illustrations, an attractive 64-page booklet, issued by the Mesta Machine Co. of Pittsburgh, and measuring 5⅛ x 7 in., features both the plant and the product, mainly the latter. There are only two pages of text, the story being told by the pictures and their captions. In nearly all cases the illustrations are full-page.

Fence Manufacturers Agree to Simplified Program

WASHINGTON, Sept. 4.—Eighty per cent of the manufacturers of farm, field and poultry woven wire fences of the United States, representing over 90 per cent of the country's annual production of that commodity, have signified their intention of accepting the simplified practice recommendation promulgated at the Commerce Department on July 11 and 12.

Woven wire fence manufacturers, distributors and consumers, representing at least 85 per cent of the national capacity, met with W. A. Durgin, chief of the Division of Simplified Practice, at the Department of Commerce, in July, in an effort to get together on some mutually satisfactory plan for eliminating excessive varieties of styles and containers existent in that industry.

As a result, this conference recommended a reduction from 552 styles of woven wire fence to 69; and a reduction from 2072 sized packages to 138. This means an 87.5 per cent elimination in the former, and a 93.4 per cent elimination in the latter.

Heat Treatment of Carbon Vanadium Steel for Forgings

Suggestions for the heat treatment of carbon vanadium steel for forgings—a steel now being used quite extensively for heavy forgings for railroad locomotives—have been formulated recently as follows:

Heating for Forging: In heating carbon vanadium billets or blooms for forging it is only necessary to follow out the usual good practice for ordinary carbon steel billets. Heat the billets slowly, uniformly and thoroughly to a temperature of 1900 to 2000 deg. Fahr., which corresponds to a light yellow color in the diffused daylight of the ordinary forge shop. As carbon vanadium steel billets are somewhat harder than ordinary carbon locomotive forging billets, there is slightly more danger of cracking or bursting them, if charged into a furnace that is very hot. It is general knowledge that cold steel should not be charged into a hot furnace.

Forging: Carbon vanadium steel forges the same as standard carbon locomotive forging steel, the only noticeable difference being that it is slightly stiffer. The forging should be finished at a low temperature, about 1300 deg. Fahr., or a cherry or full red.

Normalizing or Air Annealing: Forgings should not be put into service as they come from the hammer or press, particularly forgings made from medium hard steel, such as locomotive forgings. They should be reheated to refine the grain, remove forging strains, and to secure the maximum combination of strength and toughness. The forgings should be reheated slowly, uniformly and thoroughly in a furnace to a temperature at which scale will just form on the forgings. This temperature is 1500 to 1600 deg. Fahr., or a light or bright cherry in the diffused daylight of the ordinary forge shop. In case the furnace available is one in which the flame would play directly on forgings, as in the case of a flanging furnace, a temporary brick baffle should be put in to protect them. After the forgings have been brought uniformly up to heat, they should be held at temperature for at least one hour per inch of diameter or thickness, then removed from the furnace and allowed to cool freely in the air, protected from rain or snow.

"River Shipping in Industry" is the title of a booklet published by the American Rolling Mill Co., Middletown, Ohio. In the past two years interest of steel manufacturers in transportation by water has been keen and a larger tonnage has been shipped on the Ohio and other rivers than ever before. Hence, this compilation of historic river shipping data on the Ohio River and its tributaries will be welcomed by those who are interested in this subject. The booklet includes a chapter on foreign inland waterways shipping and also one on Ohio and Mississippi River terminals. The company originally compiled the data for its own information, but decided to publish it for the benefit of all who might be interested.

Position of Tin Plate Makers Explained

Vice President Davis of American Sheet & Tin Plate Co. Answers Complaints and Says Some Proposed Changes Could Not Be Adopted

WASHINGTON, Sept. 4.—The position of the tin plate manufacturers with regard to the complaint of canners and grocers about the quality of tin plate was clearly set forth by Vice-President S. A. Davis of the American Sheet & Tin Plate Co., Pittsburgh, at the conference on Wednesday, Aug. 15, at the Bureau of Standards. While Mr. Davis was briefly reported in THE IRON AGE of Aug. 23 in connection with the conference, the address of Mr. Davis was so able and is considered to have been such a complete answer to charges against the quality of tin plate that the address is worthy of being presented more fully. It covers a problem that the tin plate manufacturer and the can maker have been working on ever since the tin plate industry was begun in the United States and shows plainly the progress that has been made in providing a high quality tin plate for the canning trade.

Mr. Davis began his remarks by pointing out that such irregularities and fluctuations as exist in the processes of manufacture of tin plate may be minimized by the most careful work, but cannot be eliminated. He explained that they have always existed, probably to a greater degree in years gone by than at present, and the generally satisfactory performance of tin plate for the canning trade in the past cannot, in the opinion of Mr. Davis, be ignored at this time. He stated that he thought this argues forcibly that tin plate as manufactured has been satisfactory for the purpose intended. Mr. Davis stated that certain discriminations for certain products to be packed may be desirable, in the light of present day knowledge, but he expressed the belief that anything tending to change generally the character of tin plate would be a decided step in the wrong direction, with untold possibilities of harm throughout the various interested industries. He told the conference that manufacturers of tin plate have regularly expended large sums of money in scientific research and in investigation covering mechanical equipment, methods, quality of materials entering into the manufacture, uniformity of weight and the amount and distribution of coating.

He asserted that inasmuch as tin plate manufacturers are at all times seriously studying their problems in the interest of improving their practice to the greatest extent possible, they should not be burdened with unnecessary restrictions or limitations which would seriously handicap their operations. Mr. Davis continued as follows:

Making Black Plate

"Black plate for coke tin plate is made from standard soft steel, both of Bessemer and open-hearth quality, either of which should and will perform the service reasonably required satisfactorily. The steel must be of a quality which lends itself to the mechanical operation of rolling in a satisfactory manner, and when finished in the form of tin plate must satisfactorily respond to the operations of the can maker and the packer. This quality is inherent in Bessemer steel as it leaves the converter. It may not be so with open-hearth, under which condition certain elements or metalloids must be added and an approximate Bessemer analysis obtained. At this point it may be well to consider that the quality of the black plate may be entirely satisfactory, but failure or irregularities occur from the use of too light a gage for the purpose. Expert investigation only can reasonably determine this feature.

"Starting with a well-made steel of either Bessemer or open-hearth quality, uncontrollable features immediately manifest themselves. Steel by either process may be of satisfactory chemical composition and homogeneity in the molten state, but due to the impossibility of uniform cooling and to the normal process of segregation, this homogeneity does not maintain in the material as cast in ingot form; and to obtain uniformity evidently, in the minds of some, approximately 40 per cent of the top end of each ingot would, of necessity, have to be discarded, the discarded portion representing a serious economic loss and being suitable probably only for melting stock. This would mean approximately 140 per cent steel production to obtain 100 per cent requirement of the tin plate manufacturer. While absolute uniformity of chemical composition does not maintain, we believe no necessity exists for this and that for all practical purposes the present day practices are entirely adequate.

Bar Rolling Limitations

"The next step in the operation is the reduction from ingot to bar form, and at this stage irregularity in weight is first introduced by bar rolling limitations. This variation, together with the variation of chemical composition, has always been and must be accepted by the tin plate maker as representing good practice. We know of no way to improve the bars as produced, neither is there a way to assort or classify if such were desirable or necessary.

"Tin mill operations are made up of many conditions, most of which are variable and can only be controlled within certain well-known limits. Starting with the inherent irregularity in bar weights, we must contend with variations in heating and in four distinct operations and variations in drawing packs with complete accuracy. Rolls must be turned concave so that when brought to the proper working temperature they will be as nearly parallel as possible. It is evident that in warming up the mills, or bringing the rolls from a cold to a fully expanded state, variations must and do occur. When proper rolling temperature has been attained, it is practically impossible to maintain this uniformly notwithstanding the use of many well-known mechanical appliances adapted for the purpose. Tables have been prepared showing thickness of plate for the various gages expressed in ten thousandths of an inch, and it should be appreciated at this point that both in the thickness of the black plate and weight of coating we are dealing with factors almost infinitesimal and difficult to comprehend.

Important Operations

"The intermediate operations between hot mill department and tinning department, comprising pickling and annealing, are of the utmost importance; the pickling operation influencing weight variation in removing both heavy and light oxides resulting from rolling operation and to some extent etching the plate properly to receive the coating. The annealing operation is of the utmost importance in eliminating rolling strains and bringing about proper ductility. This operation is now undergoing evolution from the personally controlled old-style furnace to modern pyrometrically controlled equipment, with general improvement in uniformity in the annealing of the product.

"Probably in no part of the operation has more thought or scientific research been devoted than to the tin house or coating department. Tin plate is made in various grades of coating, ranging from coke quality to high grade charcoal quality carrying 5 to 6 lb. of tin per box; these grades are always obtainable and can be specified for by the customer when his requirements demand. The equipment has been changed frequently in the interest of uniformity of coating, baths maintained at as uniform a temperature as possible by pyro-

(*Continued on page* 649)

LABOR-SAVING USE OF CRANES

Material Handling Methods Feature New Plant of Alfred Box & Co.—Layout Outlined

Saving labor by the liberal use of cranes of various types, each type being selected as most suitable for a given service, is an outstanding feature of the new plant of Alfred Box & Co., Inc., Ontario Street and Trenton Avenue, Philadelphia. A comparatively small personnel has been found sufficient because of the extensive application of cranes and hoists.

The product of the company includes standardized electric traveling cranes of 5, 10, 15 and 20 tons capacity; hand-operated traveling cranes of cable and drum type; portable monorail electric hoists, chain hoists; I-beam trolleys; and grab bucket operating cranes of a patented three-motor, double-drum type. Manufacture is on a production basis; parts are made to stock and requisitioned from stock for assembly.

The new building is of improved monitor design, of brick and steel, and is 250 ft. long and approximately 110 ft. wide with two 30-ft. side bays and a 50-ft. central bay. The building has a temporary end for contemplated extension. The main or central bay is used for assembly work exclusively. The west bay is occupied by the machine shop, and the front part of the east bay for a distance of 100 ft. is taken up by the finished storeroom, the balance of this bay being used for the assembly of small crane bridges. The height of the main bay is 31 ft. under the truss and 25 ft. under the crane rail. The side bays are 19 ft. high under the trusses.

Machine work follows a line from the front end of the west bay to the rear, and is delivered to stock or to the east bay if for small parts assembly or to the central bay if for immediate use in assembling a large crane. Parts are handled progressively from one machine to the next and also assembled progressively, completely assembled cranes ending up at the test pit located in the center of the central bay. After testing, the cranes are loaded on freight cars adjacent to the test pit, a railroad spur leading through the main bay up to the pit having been provided to eliminate extra handling of cranes ready for shipment.

The test pit, which is of concrete, is 10 by 16 by 12 ft. deep, and contains sets of weights for testing cranes and hoists from 500-lb. to 15-ton capacity under actual working conditions. The cranes are tested to 25 per cent overload capacity and electric current consumption under various loads is recorded. Hoisting cable racks are located adjacent to one end of the test pit, the cable being put on the equipment just before the test. The cable is on reels and is uncoiled directly from the reels on which it is received.

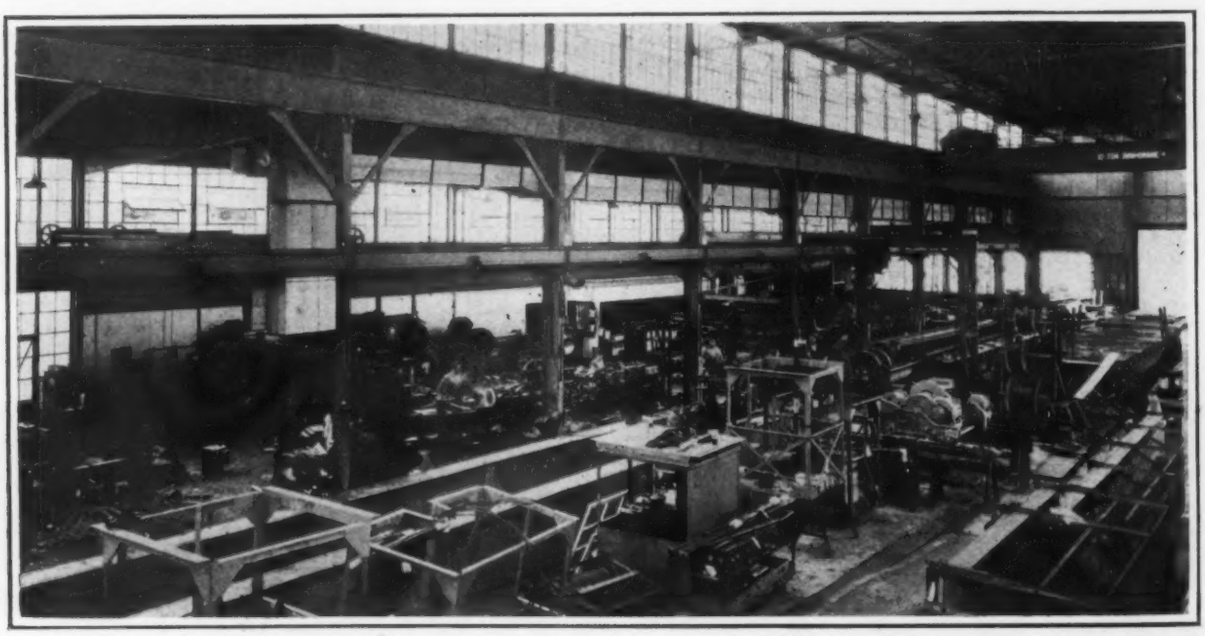
Throughout the plant small cranes have been installed at various points as auxiliaries to the larger traveling cranes. The practice has proved highly economical, not only because of the cost saved in operating the smaller cranes in place of the larger ones on the same duty, but also because it eliminates delay in operations at various points of the shop pending the availability of the larger crane.

The central bay is served by a 10-ton overhead traveling crane and four one-leg gantry cranes, which travel along the side of the bay. Three overhead traveling cranes serve the west bay or machine shop, three swing-bracket jib cranes with electric hoists being also provided for service to specific machine tools. Material is kept off the floor by the use of large ball bearing box trucks, which are loaded with semi-finished material at the storeroom, pushed to the machine shop, passed from machine to machine and finally delivered to finished stores or to assembly.

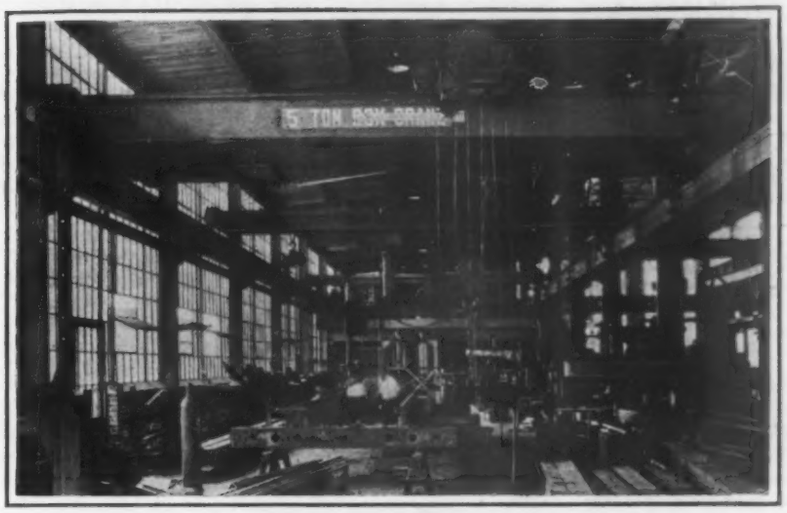
Two overhead travelers equipped with electric hoists and fitted with drill presses for drilling structural material serve the east or small assembly bay, and with this equipment it is said that one man can handle work up to 3 tons in weight without assistance. From the east bay the crane runway extends 60 ft. into the yard at the rear of the building, a 5-ton three-motor crane being used for yard and inside service. A second railroad siding leads up to the rear entrance of this bay, structural material received on cars being unloaded by the crane directly on to the storage piles and racks. It is planned to extend this crane runway 100 ft.

An auxiliary unit which has been found unusually economical is a self-supporting jib crane installed at the shipping platform, the arrangement of which may be noted from the accompanying view of the front end of the plant. This unit greatly facilitates the loading and unloading of trucks, leaves the larger crane in the main bay free for heavier service, and is always ready when needed. Material being shipped is placed on the scale by this crane and, after being weighed, is picked up and placed on the trucks. The shipping platform is recessed below the floor level, an arrangement intended to facilitate loading. Steel rolling doors at the front end of the building may be shut, thus providing a closed-in shipping platform, which is comfortable in winter, and partly loaded trucks may be held at the shipping platform overnight, the loading being resumed immediately upon arrival in the morning.

The tool room, locker and washroom and superin-

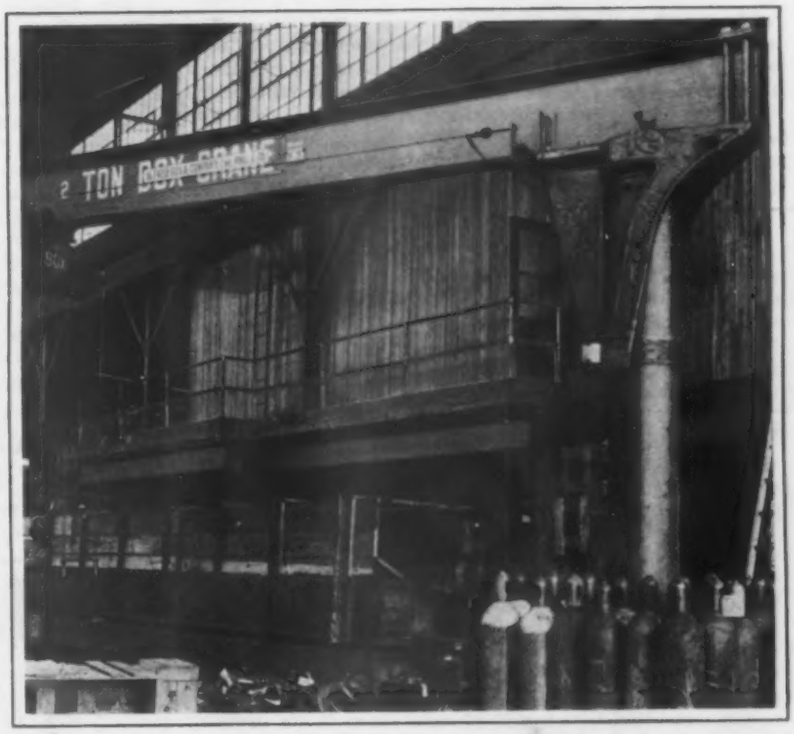


View of the Main Erecting Floor. A crane trolley is mounted over the test pit, and the cable racks adjacent to the pit may be clearly seen. The railroad siding running up to the pit may also be noted; the cranes being loaded directly upon the adjacent freight cars after test. Beyond the erecting floor may be seen part of the machine shop bay and the tool room



View Showing Crane Arrangement In the East Bay, Which Is Used for Assembly of Small Cranes. Special cranes, equipped with drills and electric hoists, may be seen in the background

The Self Supporting Jib Crane, an Auxiliary Unit Used to Serve Shipping Platform and Scale, Is Shown Below. The crane occupies practically no floor space and has been found an unusually economical unit



tendent's office are in an offset from the west or machine shop bay, and take up space of 15 ft. by 120 ft. long. The superintendent's office is located centrally between the ends and projects a few feet into machine shop, windows in the front sides permitting of a full view up and down the shop.

Careful attention has been given to the lighting. Lights are arranged so as to eliminate shadows. There are overhead lights, side lights on posts, and individual lights for precision machine tools. A flood light at the front end lights the entire shop at night and is used by the watchmen when making inspection tours. Wall plugs for portable electric tools are located at each column. Heating is by means of hot air circulated under pressure, the same outfit being used in summer for circulating air within the shop. Drinking fountains equipped with sanitary coil coolers are placed about the shop, so that it is unnecessary for workmen to walk more than 60 ft. from any point in the shop to get a drink.

Electric power is used throughout, alternating current being converted into direct current by synchronous converters located in a room at the forward end of the east bay. A balcony extending along the east wall and adjacent to the main office permits a full view of the shop from above. The pattern shop and storage is located in a separate one-story building which is 40 x 120 ft. in size.

Routine of Handling Orders

Orders received are sent to the engineering department, which issues simultaneously a drawing list to the shop and a bill of material to the storekeeper. The storekeeper requisitions parts from stock or issues work orders to the shop to make necessary parts that are not in stock. When all material is on hand an assembly order is issued, which is the shop's authority to assemble and prepare a given crane for shipment. Theoretically, the shop is continuously working against work orders for stock material. A perpetual card inventory is kept, one card for each piece that makes up the product. On these cards is noted the maximum quantity to be worked up at any one time and also the minimum quantity to be kept in stock. When the card record shows a minimum quantity on hand, unless previous orders have been issued to curtail or increase production, the storekeeper instructs the purchasing department to order the maximum amount of raw material, which on receipt is worked up to replenish the stock. Thus the stock is always maintained to the predetermined quantity.

Alabama Power Co. to Build Large Water Power Plant

BIRMINGHAM, Sept. 1.—One of the largest, if not the largest, hydropower dams in the entire South will be constructed at once at Cherokee Bluffs, on the Tallapoosa River, by the Alabama Power Co., Birmingham. The dam will be 120 ft. high and 800 ft. long and the plant is planned to develop ultimately 132,000 hp. O. G. Thurlow, chief engineer of Alabama company and its subsidiary, the Dixie Construction Co., estimates that it will require over 2½ years to complete construction. Three units generating 44,000 hp. each are to be installed.

A camp will be built at the site to house employees and their families, and accommodations for a minimum of 3000 will be provided. A water supply system with modern filtering plant and sewerage connections will be built, as well as a hospital, recreation hall, motion picture show, commissary and the like.

The plant will have an initial installation of about 88,000 hp. The Dixie Construction Co. will make no purchases until the end of the present or the beginning of the coming year.

ERA OF EDUCATED WORKMAN

Secretary Davis's Address at Birmingham—President Coolidge's Characteristics Described

BIRMINGHAM, ALA., Sept. 4.—The United States has reached a new era for labor, the era of the educated workman, said Secretary of Labor James J. Davis in an address here yesterday at an open meeting for the citizens of Birmingham.

The address consisted in part of a tribute to the late President Warren G. Harding because of his efforts to establish industrial peace. It was declared that President Coolidge will be a true friend of the American workman. It was through Mr. Harding's "untiring industry and devotion to the ideals of American labor that this Labor Day finds that archaic institution the 12-hr. workday and the seven-day week practically eliminated from the great basic industry of our country, the steel industry," Mr. Davis said. "Following his leadership, the Department of Labor has secured an agreement among manufacturers of boxboard looking to the end of the 12-hr. day in that industry. It is my confident belief that the spirit of President Harding will continue to fight for the cause of American labor, and that the time is not far distant when no workman in this country will be forced to work more than eight hours a day, six days a week. There can be no higher ideal for American labor than President Harding's wage creed, which may well become one of his greatest monuments, reared in the heart of every true American."

Turning to the Trades

Amplifying his statement regarding the educated workman, Secretary Davis pointed out that the people of the United States have always prided themselves on their thirst for education, but within the past few years, since the great war, educated Americans have been turning more and more to the manual and mechanical trades.

"We are making progress away from the fetich of the white collar job," said the Secretary. "The patriotic impulses of the war, together with the increased wages caused by war demands for production, taught many of our young men that in the ranks of manual labor they could find healthy employment at remunerative wages. Most of these young men were of the so-called educated classes, and they brought to the field of manual labor an educational standard which has been bearing results, for the intelligent workman trained in his craft is the best workman, for himself, for his employer and for his community. That education which combines the training of head and heart and hand is the education which will elevate labor to its proper place in the human scale of things.

"Both employer and employee in America are steadily realizing the importance of cooperation, are more and more convinced that they are partners in production, and that intelligent working together offers the best results for both of them. As standards of intelligence among our workers improve, they are reaching the point where they stand on a more nearly equal basis with the employer in their negotiations and in their daily life. Many causes are contributing to this better feeling between the workers who make industry possible and the men who manage industry. Labor in many crafts has already established apprentice schools, where beginners may be trained in the trades, and where at the same time they may have their full share of academic instruction. Labor is coming to know that the worker who can visualize his completed task, the carpenter who can see in the future the great building for which he saws the board, is the worker who gets the most out of life in material and spiritual returns."

A President of Heart and Brain

Secretary Davis declared President Coolidge's devotion to duty and principles has marked his progress from the beginning of his public life.

"In my association with him at the Cabinet table I have found him ever warm-hearted, with a generous and active sympathy for the problems of others," the Secretary asserted. "More than once he has given me that word of sympathetic help which is the truest aid in times of weariness and stress and difficulty. America will find in him not alone a brain and conscience to lead, but a kindly heart to help. He will be a true friend of the American workman, for he has known hard work all his life. He will follow no wild phantasies in a search for the millennium, no will-of-the-wisp of thoughtless experiment. He will move forward step by step, guided by the light of progress, by experience and by studious reasoning. He preaches the gospel of the square deal, and in whatever lies before him he can be depended upon to be just, fair and kindly."

Etching Pits

A well-illustrated article in the *Revue de Metallurgie* for June, by Albert Portevin, discusses the action of various etching solutions; more particularly, etching figures or etching pits. In addition to the numerous illustrations there are a great many references so that the article is quite comprehensive on the interesting subject of etching pits.

The treatment recommended to develop them for ordinary iron or steel specimens is to etch with a 12 per cent aqueous solution of copper ammonium chloride for 2 to 4 min., followed or not by a second attack of about 30 sec. in 10 to 20 per cent solution of strong nitric acid in water. In many cases it is best to give a preliminary etching followed by a light repolishing before the final attack. The form, number, development and clearness of the figures depend on the nature and concentration of the solution, on the temperature and the length of time of attack. They are only clearly observed on crystalline grains of sufficient size; that is, in metals and alloys of coarse texture which are usually not of much value for their mechanical properties. They are of great value in determining the crystalline orientation, although not of general application in the technical and industrial uses of metallography. G. B. W.

Theft-Proof Electric Light Bulb

To prevent theft of electric light bulbs from industrial plants and other buildings, Lester Kulp, 143 West Austin Avenue, Chicago, is placing on the market the bulb illustrated, which although of special design, is said to fit any standard light socket.

It may be noted that guards, locks, keys or springs are not used. One of the contacts is at the top just as in an ordinary lamp, and the other is a brass ring, fastened at the bottom of a porcelain plug. The plug has a groove which is filled with plaster of paris, lightly holding the brass shell in place. After the lamp is screwed into the socket an extra turn breaks the plaster of paris seal, so that the lamp is free to turn in the shell, and at the same time maintains electrical contact. The shell, however, cannot be turned in the socket. The shell being spun over the ring, is said to screw up so close to the socket that fingers or tools cannot grasp it. The bulb is said to be easily removed for replacement when burned out. Standard sizes are available.

The framework girders of the new navy airship ZR-1, which are of duralumin, an alloy of aluminum and copper, so light and strong that a 10-ft. length of one of them can be easily lifted on a man's little finger, yet if supported on its ends can carry all the men who can find room to sit on it. It takes more than 13 cu. ft. of gas to lift each pound weight, and the ZR-1, as long as a dreadnought, weighs little more than a Pullman car.

ZIRCONIUM IN STEEL

Neutralization of the Embrittling Effect of Phosphorus—Summary of the Entire Investigation.

Further information concerning the effects of zirconium in the manufacture of steel is contained in a paper, "Some Effects of Zirconium in Steel," by Alexander L. Feild, research metallurgist Electro Metallurgical Co., New York, presented at the summer meeting of the American Institute of Mining and Metallurgical Engineers at Montreal, Aug. 30. In THE IRON AGE, May 10, 1923, an article was published on the same subject by F. M. Becket, chief metallurgist of the same company. It contained preliminary information on some phases as presented before the spring meeting of the

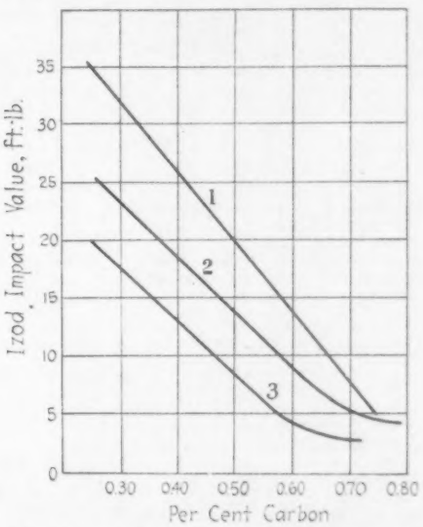


Fig. 9—Relation Between Izod Impact Values and Carbon Content for: (1) Ordinary Low Phosphorus Steels; (2) High Phosphorus (0.140 per cent) Steels Treated with Zirconium; (3) Same High Phosphorus Steels Not Treated with Zirconium. Tests made in annealed state

American Electro-Chemical Society in New York, May 5.

Zirconium and Phosphorus in Steel

One important effect resulting from the use of zirconium in steel refining was necessarily omitted from the latter paper. This point is, however, discussed in Mr. Feild's contribution, which also goes into the details of all phases of the matter, giving data and tests on the results obtained. The portion of the more recent contribution, which is regarded as distinctly new,

Table 15.—Mechanical Properties of Annealed Carbon Steels, High-Phosphorus Series, Ladle A Treated with 0.20 Per Cent Silicon and 0.04 Per Cent Zirconium as Silicon-Zirconium

Percentage

Heat Number	Carbon	Phosphorus	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation, Per Cent	Reduction of Area, Per Cent	Brinell	Izod Number, Ft.-lb.
200	0.172	0.141	40,887	65,406	35.5	60.8	109	35.6
107	0.170	0.144	46,658	70,772	35.6	59.6	119	33.0
142	0.184	0.124	45,894	68,983	34.6	63.2	119	45.3
201	0.264	0.154	46,297	75,363	32.3	57.0	130	30.4
220	0.258	0.165	45,335	76,582	32.1	56.9	126	25.5
183	0.302	0.174	49,695	82,500	31.3	52.4	127	15.2
147	0.420	0.122	55,002	94,901	25.8	43.2	159	19.0
215	0.482	0.171	48,611	90,233	26.4	40.2	163	10.3
222	0.586	0.118	53,440	104,653	21.4	41.4	174	11.8
137	0.624	0.162	54,297	110,770	18.0	27.0	207	4.1
135	0.788	0.128	55,960	120,773	17.5	27.3	192	3.5
Av.	0.377	0.146	49,280	87,358	27.3	48.1	148	

has to do with the effects on phosphorus in steel in the presence of zirconium or as a result of using this metal. The extract is as follows:

A favorable effect of zirconium on the Izod number of annealed high-phosphorus steel was observed early in the present work. Accordingly, the mechanical properties of steels containing carbon, phosphorus, and zirconium in varying proportions were investigated. Tables 15, 16, and 17 contain the results obtained for a series of 11 heats with carbon contents covering the

Table 16.—Mechanical Properties of Annealed Carbon Steels, High-Phosphorus Series, Ladle B, Treated with 0.20 Per Cent Silicon as 50 Per Cent Ferrosilicon

Percentage

Heat Number	Carbon	Phosphorus	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation, Per Cent	Reduction of Area, Per Cent	Brinell	Izod Number, Ft.-lb.
200	0.132	0.147	42,500	63,781	36.0	65.2	109	44.7
107	0.162	0.149	46,875	72,968	35.6	59.6	119	35.3
142	0.186	0.124	44,059	67,008	35.8	61.7	119	41.9
201	0.236	0.153	43,307	72,079	34.1	60.4	130	34.1
220	0.254	0.161	46,420	74,466	31.7	56.1	126	18.5
183	0.288	0.166	48,231	77,735	32.6	55.0	130	22.2
147	0.424	0.129	56,623	95,422	24.3	40.1	163	12.7
215	0.468	0.169	51,821	91,143	27.6	42.9	153	8.2
222	0.566	0.119	55,226	103,578	22.6	36.7	174	10.0
137	0.632	0.168	60,417	114,383	18.8	30.7	199	3.2
135	0.788	0.133	52,061	112,453	16.9	22.7	217	2.3
Av.	0.376	0.147	49,776	85,911	28.7	48.3	149	

range 0.13 to 0.79 per cent. Ferroalloy practice was the same as in the low phosphorus series.

The effect of 0.15 per cent added zirconium in increasing Izod number is especially to be observed. Fig. 9 shows graphically the relation between carbon content and Izod number of ordinary low phosphorus steels, of steels containing on an average 0.14 per cent phosphorus and treated with 0.15 per cent zirconium, and of the same high phosphorus steels not treated with zirconium. These curves are based on much more complete data than are given in Tables 15 to 17.

The effect of zirconium upon the Izod number is essentially a neutralization of the embrittling effect of phosphorus, as the Izod number of ordinary low phosphorus steels is not appreciably affected. No evidence of actual chemical combination between zirconium and phosphorus has been obtained by chemical or microscopic examination. As notch toughness is intimately related to the properties of the intercrystalline material, there is reason to infer that zirconium in high phosphorus steels favorably modifies the structure and com-

Table 17.—Mechanical Properties of Annealed Carbon Steels, High-Phosphorus Series, Ladle C, Treated with 0.20 Per Cent Silicon and 0.15 Per Cent as Silicon-Zirconium

Percentage

Heat Number	Carbon	Phosphorus	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation, Per Cent	Reduction of Area, Per Cent	Brinell	Izod Number, Ft.-lb.
200	0.130	0.153	39,457	64,803	37.1	65.3	109	47.9
107	0.162	0.149	47,880	72,333	35.0	64.0	119	46.0
142	0.186	0.124	34,303	66,104	36.7	61.5	119	50.6
201	0.268	0.154	45,356	73,886	35.6	58.8	119	35.6
220	0.232	0.160	35,300	76,048	22.9	57.6	126	24.8
183	0.278	0.166	35,341	76,411	32.4	59.3	127	28.3
147	0.448	0.126	44,956	94,275	26.6	43.8	159	14.6
215	0.490	0.162	41,875	84,338	27.0	40.5	160	13.5
222	0.568	0.117	40,897	99,117	24.2	40.8	170	12.1
137	0.632	0.167	45,560	111,191	19.2	30.0	199	6.1
135	0.782	0.132	47,917	116,805	17.7	26.4	210	4.1
Av.	0.380	0.146	41,713	85,028	29.5	49.8	148	

position of this material, possibly because of its concomitant action on oxygen and nitrogen.

Summary

The author's summary of the entire investigation follows:

In this paper, there have been presented some of the results obtained in the experimental manufacture and testing of steels treated with zirconium. Data are given in support of a number of conclusions regarding the chemical behavior of zirconium toward the major impurities in steel, namely, oxygen, nitrogen, sulphur, and phosphorus, and the resultant effects produced on mechanical properties. It is shown that:

1. Zirconium combines chemically with oxygen, nitrogen and sulphur, in the order given, and is able to neutralize the embrittling effect of phosphorus in whole or in part.

2. A relatively small addition of zirconium makes possible the satisfactory rolling of steels containing as high as approximately 0.30 per cent sulphur, which without zirconium treatment break to pieces on the first pass through the rolls.

3. Plain carbon steels treated with approximately 0.15 per cent zirconium exhibit in the heat-treated condition tensile properties that closely approach those of alloy steels, especially in that range of drawing temperatures between 300 and 450 deg. C.

4. Zirconium reduces the total oxygen content of steel and operates to prevent the occurrence of emulsified slag and "banded" structure.

5. Zirconium combines with the nitrogen dissolved in molten steel to form a crystalline microconstituent of a bright lemon-yellow color, which is, in large part, removed from the steel while the latter is still molten.

6. Zirconium forms, with the sulphur content of steel, an acid-insoluble sulphide and eliminates from high-sulphur steels the last traces of iron sulphide.

Besides the work reported in this paper, the Electro Metallurgical Co. has accumulated during a period of several years information on the commercial application of zirconium; these results it is intended to publish at some future date.

McKUNE OPEN-HEARTH FURNACE

Operating Results of Blower Torch Type in a Canadian Plant

In an article entitled "Canadian Open-Hearth Practice," in a recent issue of the London *Iron and Coal Trades Review*, results are published based on the experience of the use of the McKune open-hearth furnace at the Hamilton Works of the Steel Co. of Canada. The article contains a description and drawings of the McKune furnace as built. In THE IRON AGE of June 2, 1921, page 1479, was published a complete description of the Egler furnace, which closely resembles the McKune furnace in principle.

The data in the article from which the following extracts are taken were furnished by John Miles of the London office of Freyn, Brassett & Co., and they are based on the working results of a furnace of the latest and most efficient type, which has been in successful operation at the plant referred to for over a year.

After a somewhat detailed description of the construction of the furnace and the fuel used, the author discusses the cost of total repairs for a plant using the McKune furnace and says that this was 1s. 4d. per ton of ingot produced at a shop where four of these furnaces are installed; this includes bricks, dampers and overall general shop repairs for the period of one year.

When using waste-heat boilers with the McKune furnace, there is a decrease in the net steam produced per ton of ingot, owing to the decrease in fuel consumption, but per unit time of 24 hr. there is approximately the same amount of evaporation with or without the McKune ports. At the Hamilton works all the furnaces are equipped with waste-heat boilers, and if the amount of fuel required to generate the same amount of steam under boilers were deducted from the fuel used in the gas producers for the open-hearth furnaces, there would be a decrease in coal consumption per ton of ingot of 30 per cent. The following are analyses of gases, coal and the record of the furnaces:

Producer gas.—CO_2, 5.2 per cent; CO, 23.2 per cent; H_2, 12.6 per cent; CH_4, 2.4 per cent; N_2, 56.4 per cent; C_2H_4, 0.2 per cent; O_2, nil. B.t.u. per cu. ft., 145.

Coke-oven gas.—CO_2, 1.6 per cent; CO, 0.4 per cent; H_2, 53.4 per cent; CH_4, 26.7 per cent; N_2, 6.9 per cent; C_2H_4, 2.6 per cent; O_2, 0.4 per cent. B.t.u. per cu. ft., 521.

Coal.—Moisture, 1.87 per cent. Analysis of air-dried sample: Moisture, 0.32 per cent; vol. comb. matter, 56.36 per cent; fixed carbon, 56.36 per cent; ash, 8.12 per cent; sulphur, 1.26 per cent.

Hot and cold metal.—Carbon, 4.0 per cent; phosphorus, 0.35 per cent; manganese, 1.2 per cent; silicon, 1.0 per cent; sulphur, 0.05 per cent.

Scrap.—Carbon, 0.15 per cent; phosphorus, 0.04 per cent; silicon, 0.03 per cent; manganese, 0.70 per cent; sulphur, 0.06 per cent.

No. 2 Furnace with McKune Ports at Hamilton, Ontario Record for June, 1922

Number of heats	90
Total charge, net tons	8,566
Ingots produced, net tons	7,518
Average charge per heat, net tons	95.18
Average production per heat, net tons	83.53
Average yield of ingots per heat, per cent	87.77
Average time of heats	7 hr. 55 min.
Average time of charging	3 hr.
Total time taken when making up between heats	0.45 hr.
Total delays for month	13 hr. 45 min.
Total coal used, net tons	1,557
Total coal used	414 lb. per ton of ingot
Percentage of hot metal, per cent	35
Cold metal, per cent	65
Outlet temp. before waste heat boiler and after valve, deg. Fahr	900
Length of life of roof, heats	350 to 400
Length of life of ports, heats	250 to 300
Side walls—back, heats	250 to 300
Side walls—front, heats	150 to 200

Average for Three Furnaces—October, 1922

Fuel practice, lb	501
Total B.t.u. per ton ingots	6,920,814
Pig metal (hot), per cent	35
Average size heats, tons	80
Average time, heats	9 hr. 30 min.
Average boiler hp. at waste-heat boiler	348 per hr.
Fuel equivalent of steam at waste-heat boiler, per ton of steel, lb	165
Net equivalent fuel per ton of steel, lb.	336

Comparison of Old Type with McKune Type

	Old Design	McKune Design, April, 1922
Average weekly tonnage, tons	1,110	1,475
Fuel per ton, lb	590	495
B.t.u. per ton	8,250,000	6,900,000
Number of heats per week	14	18.7
Tonnage per heat	79.1	79.1
Time of heat	11 hr. 10 min.	8 hr. 25 min.
Coal gasified per hour, lb	4,160	4,660
Tonnage increase, per cent	....	33
Fuel saving, per cent	....	15

Bethlehem Steel Co. (Two Months)

	Old Design	McKune Design
Average heats per week	13.0	18.1
Tons per heat	78	78
Fuel per ton, lb	603	487
Tonnage increase, per cent	....	39
Fuel saving, per cent	....	19

Vulcan Mold & Iron Co.'s New Plant

The Vulcan Mold & Iron Co.'s new ingot mold foundry at Latrobe is now producing about 50 tons daily. The company is specializing in high-grade split molds for crucible and electric furnaces running in all sizes and shapes, and through the purchase of the entire mold business of the Blairsville Iron Works has on hand patterns and equipment for the manufacture of most sizes used by tool steel companies. It also specializes in small solid molds and particularly those of intricate shape such as corrugated and fluted molds and those of the Gathmann type.

The plant, which occupies five acres, consists of the main foundry, 180 ft. by 300 ft., in which all molding is done by molding machines, and one building, 70 by 90 ft. Auxiliary buildings include machine and pattern shops.

The authorized capital stock of the company is $500,000, which is nearly all owned in Latrobe, Pa. The board of directors and officers are as follows:

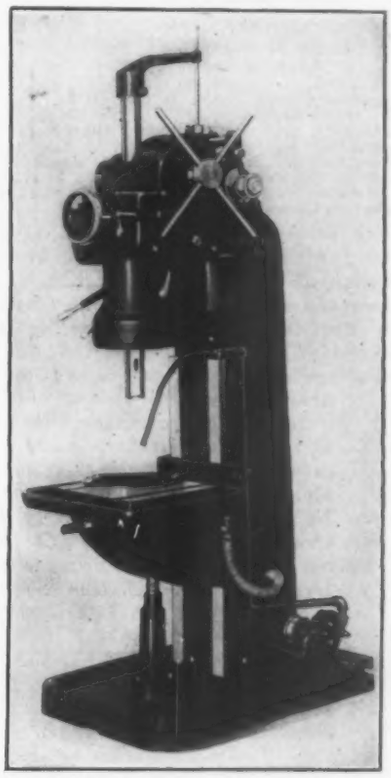
E. H. Williams, president; D. T. Sipe, chairman; C. M. Semler, M. W. Saxman, Joseph E. Barnett, F. B. McFeely, H. H. Smith, secretary and treasurer.

M. Lomchakoff of the Technical University of Prague is now in this country to study industrial problems, including power development, generation of gas, and the use of pulverized fuel and lignite. He is being aided in his task by officials of the Engineering Federation, the Feleral Power Commission and the U. S. Bureau of Mines.

New Production Drilling Machine

A new high-duty drilling machine, having a capacity of 1½ in. in solid steel, has been brought out by the Minster Machine Co., Minster, Ohio. The machine is designated as the No. 9, and although intended primarily for production work, it is claimed that various features provided permit its use on work of wide range.

Three types of drive are available, one with tight and loose pulley, another having single pulley with single friction clutch mounted on the driving shaft to



High Production Drilling Machine. Three types of drive are available. The speed range is from 73 to 550 r.p.m. and feeds are from 0.006 to 0.159 in. per revolution of spindle. Power and hand feeds and a rapid traverse are provided for the spindle

transmit forward motion, the third being a single pulley drive with double friction clutch mounted on the driving shaft to transmit power for both forward and reverse motion. The latter provides a drive for a tapping attachment, the reverse speed of which is one and one-half times that of the forward speed.

The machine has two mechanical speed changes, which with a series of change gears provide a spindle speed range of from 73 to 550 r.p.m. These gears are conveniently located on the front of the machine. The change gears are close to the extreme lower end of the spindle, an arrangement intended to reduce torque to a minimum. The sliding gears giving the two speed changes are shifted by a lever conveniently located on the left side of the machine. The sliding gears giving the two speed changes are shifted by a lever at the left side of the machine.

Two mechanical feed changes are provided through sliding gears, which in addition to a series of change gears provide a feed range of from 0.006 in. to 0.159 in. per revolution of spindle. Hand feed for the spindle is obtained by placing the sliding feed gear shifter lever in neutral position. The feed length of the spindle is 15 in., which is emphasized as being unusually long for a machine of this size. The spindle is equipped with a guide rod upon which is mounted an adjustable stop which can be set to trip the feed at any predetermined point. When the spindle reaches this point on its downward course the feed mechanism is automatically disengaged, and if desired the spindle can be adjusted to automatically return to its upward position.

The machine is provided with a heavily ribbed plain table which is gibbed to a wide bearing on the column. The table has ample oil grooves and is reinforced to permit a boring bar to pass entirely through. If desired the machine will be provided with a compound instead of a plain table. The compound table is of heavy construction and gibbed for heavy service. The base of the machine has slots for receiving adjustable motor bases, the motor being mounted directly upon this base. A 5-hp. constant-speed motor running at 1100 to 1300 r.p.m. is recommended.

A reservoir for the cooling compound is located in the base, the coolant being delivered to the tools and worked by a rotary geared pump. The lower part of the main head casting acts as an oil reservoir and at the lower end of the vertical clutch shaft there is a geared oil pump which is located below the oil level. This pump forces the oil up through the vertical clutch shaft and discharges it over the miter gears at the top of the shaft, the oil gravitating to the gears below.

The principal dimensions of the machine are as follows: Distance from the center of spindle to face of column, 10⅛ in.; end of spindle to plain table, 30 in., and to compound table, 24 in.; end of spindle to base, 44 in. The vertical adjustment of plain table is 13 in. The finished surface of plain table, 16 x 16 in. and of compound table, 12 x 31 in. The spindle has a No. 4 Morse taper.

The net weight of the machine with plain table is 2100 lb. and with compound table, 2500 lb.

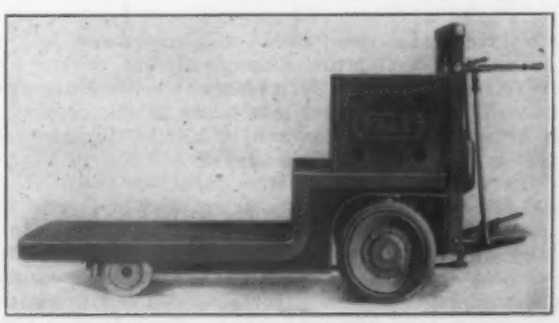
New Low Platform Truck

Another addition to the K model trucks of the Yale & Towne Mfg. Co., Stamford, Conn., recently described in THE IRON AGE, is the K-23 low platform truck illustrated. This is a general utility unit for handling loads of a miscellaneous character, the low platform facilitating the piling of heavy loads on the truck either by hand or auxiliary crane equipment.

The rated capacity is 4000 lb. The wheel base is 55¼ in. and the wheel tread 33¾ in. The length is 110¾ in., the width 38 in., and the height 53⅜ in., overall. The platform is 38 x 60 in., or 16 sq. ft., and the height is 11 in. The ground clearance is 5 in.

The turning radius of the outside edge of the truck is 89 in., the inside radius 35 in. Four-wheel steering is provided. The maximum speed of the truck is 8 miles per hour, empty, on level concrete, and loaded to 4000 lb., the maximum speed is 6¼ miles per hour on level concrete.

Parts are grouped in self-contained major units, and the spur-geared unit power axle used is inter-



Low Platform Truck for Economical Movement of Miscellaneous Material. Parts grouped into self-contained major units is a feature

changeable with that used in the other trucks of this series. The frame is of pressed steel, the main longitudinal members being of one piece, the wheels being also of pressed steel, and of disk type. The motor is series wound, totally inclosed, and of 36 volt, 45 amp., 1800 r.p.m. continuous rating. The controller is the company's drum type with renewable contact and cut-out switch. The brake is of the external contracting double-shoe type, on the motor shaft, and is operated by foot lever. The weight of the truck with Exide battery is 2500 lb.

Mechanical Characteristics of Castings*

Examination of Semi-Steel Tensile and Compressive Strength, Elasticity and Shearing Resistance, Compared with Its Hardness—Semi-Hard Steel Also Considered

BY ALBERT PORTEVIN

IT is well known that considerable application was given semi-steel during the World War. This overcame the difficulties which would have resulted otherwise from the insufficient production of steel shells. As a result of this increased use of such castings, extensive examinations of the physical properties of this metal have been carried on.

In general, these tests related to castings called semi-steel, which has a relatively low percentage of carbon (less than 3.2 per cent), part of which is in graphitic form so as to permit easy machining, while still presenting a sufficient proportion of combined carbon (at least 20 per cent of the total carbon) to obtain the high strength desired—a strength not less than 25 kg. per sq. mm., (35,500 lb. per sq. in.) under tension. This proportion is obtained by a judicious selection of the

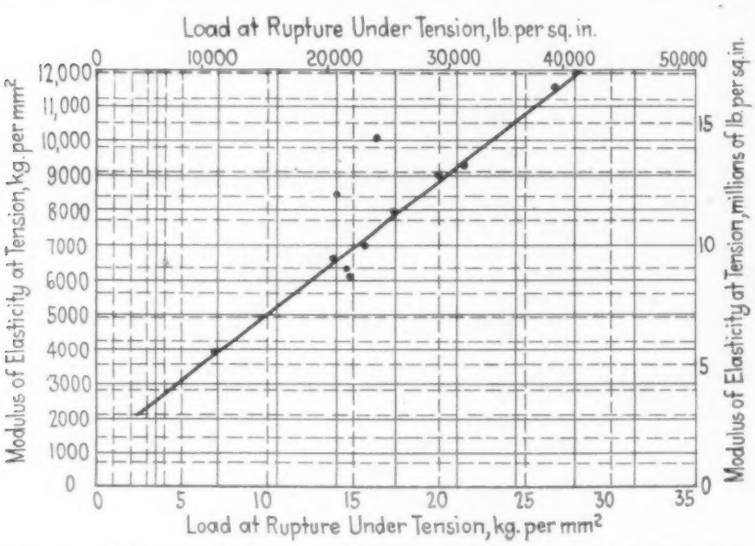


Fig. 21—Relation of Modulus or Coefficient of Elasticity, M, of Semi-Steel in Tension to Its Rupturing Load, R, per Unit Section. The inclined line drawn through the observed and plotted "points," fulfils the equation $M=385R+1150$

percentages of carbon, silicon and manganese, and by the speed of cooling and consequently the thickness of the section.† For this purpose semi-steel was prepared by melting pig iron and steel scrap in the cupola, or by recarburizing open-hearth or electric furnace cast steel and additions of ferroalloys.‡

In fact, as the tests were made on shells of all calibers, of quite different sections, and to a great extent on products which had been rejected by inspectors, it appears that these castings, although manufactured by the processes just indicated, have widely varying physical proportions. The percentage of carbon also did not always come within the limits characterizing semi-steel. Hence, with the wide range of products examined it was possible to assemble data which afford conclusions applicable not only to semi-steel, but also to castings in general. In all cases we have to deal here only with irons which have not undergone further thermal treatment.

*Translated by E. J. Lowry, Hickman, Williams & Co., Pittsburgh.

†The empirical rules of Mr. Prache are expressed by the following formulae for an average admixture of Mn of 0.8 per cent:
Si + C equals 4.5, for shells of small and medium caliber.
Si + C equals 4.2, for shells of large caliber.

‡In the same way, it is possible to add to the hot metal cast turnings that are little carburized, to mix the liquid cast iron and liquid steel, or to decarburize the cast iron partly in the converter, to arrive at the proper analysis.

The French artillery department imposed the following conditions of acceptance for lots of semi-steel castings:

1. The tension and shock test shall be made on test bars run in molds separated from those of the shells. The tension bars were tested after being turned to a 60 mm. (2⅜ in.) diameter, and the shock bars, 40 x 40 mm. (1.6 in. square) were broken, in the unfinished condition, by successive blows of the drop hammer.
2. The tension test was made on a certain number of shells selected at random from each lot.

From the point of view of the qualification of the metal used for shells, it was difficult to make any worse selection as to the kind of mechanical tests imposed. Inasmuch as the properties of castings are essentially a function of the speed of cooling of the size of section and of the chemistry of the product, it is foolish to determine them by test bars poured in separate molds.

As to the shock test, we have come to the conclusion that it has no significant value. We have, therefore, deliberately omitted it from this investigation. Not only is the process by successive shocks now out of style and condemned, but the dynamic tests do not offer any information as regards the castings. This is because the castings show only one style of breakage—the intergranular. Finally Mr. Fremont* has shown experimentally and decisively that there is no relation between the results from such shock tests and the strength of the casting. Test bars broken by the blow of a "drop" from an inconsiderable height presented a resistance to shearing varying within the extremes, and yet within the same limits as those broken under greater heights.

We will, therefore, review successively:

1.—The results furnished by the tension test, especially as regards the modulus and limit of elasticity.

2.—The results of the compression test, with a special comparison between the elastic limits under tension and under compression.

3.—The application of the bar test for castings, and the experimental relations existing between the Brinell hardness number and the results of the tension and compression tests.

As to the static bending and shearing tests, we have established only a relatively restricted amount of data. The examinations of Mr. Fremont** have moreover nicely shown that they constitute only selective methods for ascertaining the mechanical qualities of the castings.

Tension Test

The characteristic and primary fact of the results obtained by the tension tests of raw pig iron†† is the weakness of the elongation at the fracture, which is always under 1 per cent—that is to say, under the order of experimental measuring errors, practically nil. It results from this that the small ductility which accompanies the tension test is a cause of the early breakage. Because of the small amount of elongation present in cast iron and because of the difficulty in obtaining precise measurement, the results obtained are practically useless.‡‡ It is known, however, that it is impossible to eliminate these efforts of elongation which occur in industrial tension tests.

Whoever has proceeded to determine elastic elonga-

tions in tension by the method of the mirrors at two points which are opposed by a test bar has noted these deformations of supplementary elongation by the differencess of variation of reflected light lengths obtained. Sometimes their results have been directly opposite, proving the difficulties experienced in obtaining correct elongation of cast iron. It does, indeed, entail the greatest difficulties and necessitates long test bars with threaded heads, and also demands before each and every test a minute adjustment of the jaws holding the test bars, wedges and lead bushings, to make it possible to harmonize to some extent the results obtained by these tests.

A tension test on castings can be considered correctly executed only when the operation is thus performed, and we shall here consider solely results obtained with these experimental conditions. Moreover, this method of mirrors is the only one which permits one, as the elongations are so small, to trace the "curve load deformations" necessary to compare properly the elastic features, modulus and limits of proportionality.

Moreover, such tests, aside from imposing on the observer the necessity of minute precautions and a great deal of patience, require considerable time, hence they go entirely beyond the reach of practical possibilities. Tension tests as currently executed are always accompanied by more or less important ductile efforts. Hence a value of the breaking load can be obtained for the castings which has often only a remote relation to the strength of the metal. All that can be said is that the strength is less than the actual breaking load, from which it differs in a variable and unknown extent.

It is necessary to pay attention to the speed of the breaking of the test bars in tension tests. It is often possible to take up a test bar once broken in the jaws of the machine and, by restarting the tension test, to obtain values of breaking loads which are 20 to 30 per cent higher than that of the first test.

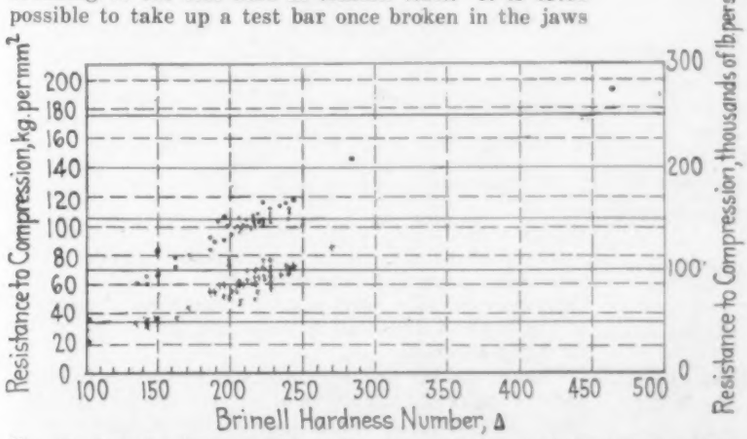


Fig. 23—Relation Between Brinell Hardness Number Δ of Semi-Steel and Its Strength in Compression. The dots in the upper band of plotted results represent $Rc = 0.5\Delta$, load at rupture under compression. The crosses in the lower band represent $Ec = 0.4\,(\Delta - 50)$, the limit of apparent elasticity under compression

Elastic Limit

Definition of the elastic limit by examination of the curves of the deformations caused by loads is essentially conventional and arbitrary. As these curves have no relation to the casting, we have adopted the limit of proportionality, that is to say, the intensity of stress at which the deformations under load cease to be proportional to the stress. This corresponds to the point where the curve of the load deformations ceases to be a straight line.

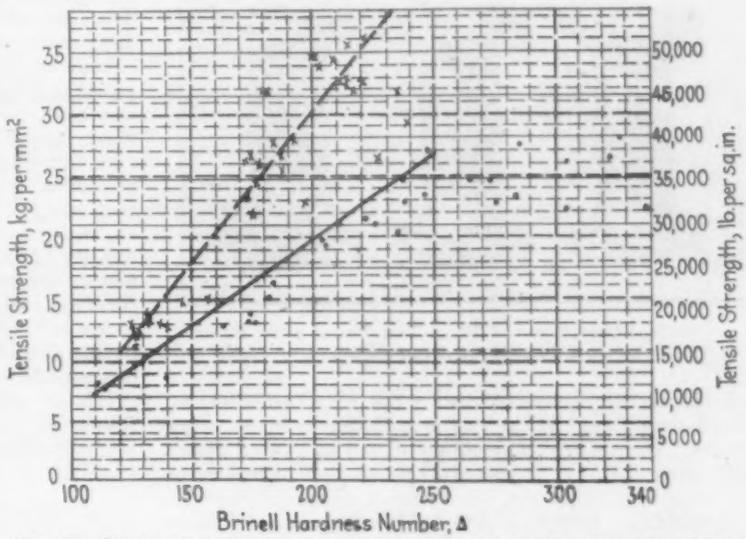


Fig. 22—Relation of Tensile Strength to Brinell Hardness Number of Two Series of Gray Iron Castings Investigated in Germany in 1913 and 1914. The small crosses, giving rise to the dash line, represent the work of Wüst and Meissner on irons constant in silicon at 1.5 per cent, with carbon varying from 2.5 to 4 per cent and manganese from 0.1 to 2.46 per cent. The dots, giving the full line, come from Wüst and Kettenbach, on irons constant in manganese at 0.15 per cent, with carbon varying from 2 to 4 per cent and silica from 0.45 to 3.24 per cent

The deformation-load curves have been shown by a dotted line which resulted from the mirror method. This permits, by an enlargement of about 700 diameters, the calculation of the alterations of the deformation. This corresponded, on an average of the test bars used, to about $\frac{1}{150{,}000}$ of the length measured. Under these conditions it is noted that the curves thus obtained do not, for certain specimens, present any rectilinear appearance. (See Figs. 9, 10 and curve *B* of Fig. 11, page 471, Aug. 23.) It is, therefore, impossible to indicate a limit of proportionality. The properties of the metal in tension can be defined only by its complete curve, hence in Figs. 9 to 14 (pages 471 and 472, Aug. 23) curves are established for nine castings, with breaking loads varying from 7 to 27 kg. per sq. mm. (10,000 to 38,400 lb. per sq. in.). Table I (page 470) sums up the total of the chemical and mechanical data — tension, compression, hardness, elongation—obtained on these castings. It should be understood that the limits of proportionality figure on this table only in case the points which were plotted in the tracing of the curves present at their origin a straight alinement.

Undoubtedly, with more determinations and with a diagram at a reduced scale, it would have been possible to arrange matters so as to find what has by tolerance come to be called the apparent limit of elasticity, but this would be a mere illusion.§ With these conditions determined, the limit of proportionality, when it was

**See "New Testing Methods for Castings," page 393, THE IRON AGE, Aug. 16.

†† In the case of reheated castings (malleable castings), the elongations at rupture may reach values a good deal higher—20 to 25 per cent—owing to the quite different form of the elements of graphite (solid graphite).

‡‡The same trouble arises when it is desired to test by tension any hardened and untempered steels which are also without elongation at rupture. Results are obtained which have no sense. Hence, we were obliged to give up the tension test also when we examined the influence of the duration of heating before tempering on the properties of hard steels. See Bulletin of the Society for Encouragement of Industries, Vol. CXXI, page 207, 1914 (in French).

§The opinion of Bouasse may here be quoted: "A metal must be defined industrially for the phenomena of tension by its tension curve. It means a loss of time and exhibits a mediocre spirit scientifically to stick either to a limit of elasticity which does not exist, or to pseudo-scientific definitions the gravest defect of which for the engineer is to lead to practical consequences which may become disastrous."

thought necessary to indicate an approximate value, was almost always one-third lower than the breaking load.

Modulus of Elasticity

These curves permit of establishing Young's modulus of elasticity by the inclination on the axis of the load

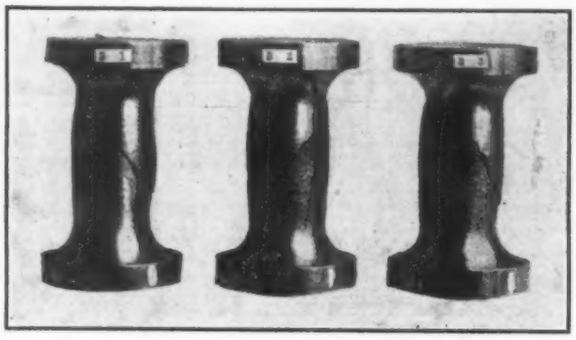


Fig. 24—Appearance of Three Test Pieces After Being Ruptured in Compression

of the rectilinear constituent when this factor exists, or of the tangent at the origin of the curve in the other cases. The values obtained are shown in Table I (page 470, Aug. 23). It is at once noticed that, contrary to what is true for steels, the modulus varies extensively. It runs from 4000 to 11,500 kg. per sq. mm. (5,700,000 to 16,350,000 lb. per sq. in.). As is shown by Fig. 21 the modulus *Mt.* varies almost lineally as a function of

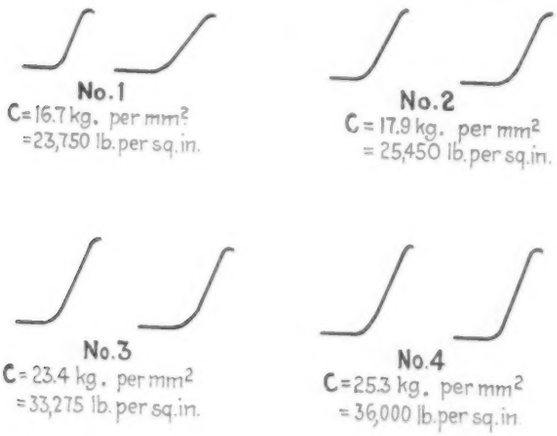


Fig. 25—Diagrams from Shearing Tests of Semi-Steel on Sections 6 x 8 mm. (0.24 x 0.31 in.). On the original drawing the scale was 0.053 to 1 for abscissae, with ordinates 50.1 kg. per mm. (2800 lb. per in.)

the breaking load *Rt*, so that the results of our experiments can be pretty exactly represented by the empirical formula:

$$Mt = 385\,Rt + 1150.$$

The most resistive castings are therefore those which have the highest modulus; hence they are subject to less deformation and a good deal more influenced by the elongation at the beginning of the tension test. Hence, the more resisting a casting, the greater the chance of the tension test being affected by errors. The result will then be less than the actual strength. This had already been pointed out by Mr. Fremont as a consequence of his tests with castings.* So we have here another reason for forbidding the present tension test to establish the mechanical properties of castings.

Tests of Bar Hardness

Comparison with the Tension Test.—In 1913 and 1914 Wüst, Kettenbach and Meissner investigated the influence of carbon, silicon and manganese on the mechanical properties of gray iron castings and published† the numerical results of the tension, bending, shock and hardness tests taken with a series of gray iron castings of variable percentages in C, Si and Mn. They did not go into the relation which might possibly exist between these different characteristics, but in approaching the tension and hardness values given for each sample, we arrive at the diagram shown in Fig. 22.

The quantitative points obtained cover the quasi-totality of the surface. Those who consider the tension test as the one test, intangible and infallible, would infer from this that the bar hardness cannot serve to grade castings. But we know, from what has been said in the preceding, what to think of the value of the ordinary tension tests taken with castings.

On the other hand, when making use of the figures shown in Table I, for which the tension tests were taken, with the precautions indicated which alone per-

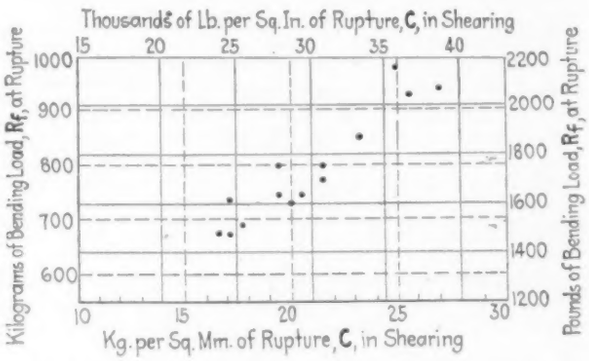

Thousands of Lb. per Sq.In. of Rupture, C, in Shearing
15 20 25 30 35 40
Kilograms of Bending Load, Rf, at Rupture
1000 900 800 700 600
Pounds of Bending Load, Rf, at Rupture
2200 2000 1800 1600 1400 1200
10 15 20 25 30
Kg. per Sq. Mm. of Rupture, C, in Shearing

Fig. 26—Relation Between Bending Load at Rupture and Shearing Rupture per Unit Area, with Semi-Steel Test Pieces of 6 x 8 mm. (0.24 x 0.31 in.) Section for Shearing Tests and 10 x 10 mm. (0.39 x 0.39 in.) Section for Bending or Transverse Tests, the Supports in Transverse Tests Being 30 mm. (11.8 in.) Apart

mit to accord them some credence, the representative points aline themselves in a remarkable manner (Fig. 18). (See page 472, Aug. 23.) It is thus shown that there does actually exist a relation between the results of the bar test and tension test when this latter test is correctly executed.

Hence the bar test will inversely permit us to check and recognize the exactness of the tension test on castings. The numerical results found can be expressed in the empirical formula:

$$Rt = 0.2\,\triangle - 13,$$

in which $\triangle$ is the Brinell hardness number (in French dureté), determined with a ball of 10 mm. (0.39 in.) diameter, load of 3000 kg. (6600 lb.), length of test 15 seconds.

In all experiments taken with the view to compare the results of the different mechanical tests with the Brinell hardness, the impression of the 10-mm. ball was always effected on the test bar itself, which was serving for the mechanical tests, or on the metal immediately in contact with this test bar.

Comparison with the Compression Test.—Here we have a much greater number of determinations, which are graphically represented in Fig. 23, and carry, on the abscissas, the Brinell hardness number, and on the ordinates the corresponding values for the breaking load at compression *Rc*, and of the elastic limit at compression *Ec*, for the same metal. These tests are determined, as has been said before, on cylinders of 16 mm. (⅝ in.) diameter and 16 mm. height.

The grouping and alinement of these points indicate that there exists, in experimental errors, a certain

*In the graphical showing presented by Mr. Fremont as representing the coefficient of elasticity of castings as a function of the resistance to bending, Fig. 28 of his paper "New Methods of Mechanical Tests on Castings," this coefficient decreases when the breaking strength increases. This is due to the fact that Mr. Fremont has taken as a measuring angle the coefficient of elasticity at the bend, this giving the inclination of the diagram on the axis of the stress, while Young's modulus expresses the inclination on the axis of the deformations. These are two complementary angles, therefore, varying in inverse directions.

†F. Wüst and K. Kettenbach. (In German:) "About the Influence of Carbon and Silicon on the Mechanical Properties of Gray Cast Iron." Ferrum. vol. XI, pages 51 to 65, 1913.

†F. Wüst and R. Meissner. (In German:) "About the Influence of Manganese on the Mechanical Qualities of Gray Cast Iron." Ferrum. vol. XI, page 97, 1914.

‡The values of the resistance to bending were obtained under experimental conditions differing from those of Mr. Fremont. They are indicated in Table I (page 470, Aug. 23).

dependence between $\triangle$ on the one hand and *Rc* and *Ec* on the other. This dependence can be expressed by the following simplified empirical relations:

$$Rc = 0.5 \triangle - 5$$
$$Ec = 0.4 \triangle - 25$$

Thus the bar test can be used for determining the qualities of castings, and not only can take the place of the tension test but, owing to its advantages, this new test may be substituted also for the compression test. These advantages may briefly be restated:

1.—It is simple and speedy. Its execution demands only a very brief time.

2.—It calls only for the machining of test bars, and can be taken without any deterioration of the product itself.

3.—It can be repeated as often as is desired and permits exploring the mass of the metal at all points.

4.—It is individual and will therefore tell about the object tested, and not merely about a test bar which is run separately and the properties of which may possibly not have any relation to the casting.

5.—It is capable of a check and leaves a controllable test mark.

In the case of direct tests on foundry pieces, precautions must be taken to obviate the errors which were pointed out to us by Mr. Fremont, and which result from the surface crust at the contact of the walls of the mold and from the eventual presence of underlying blow-holes. This can be made sure by repeating the tests and making the imprints, after having applied the grinder on the surface.

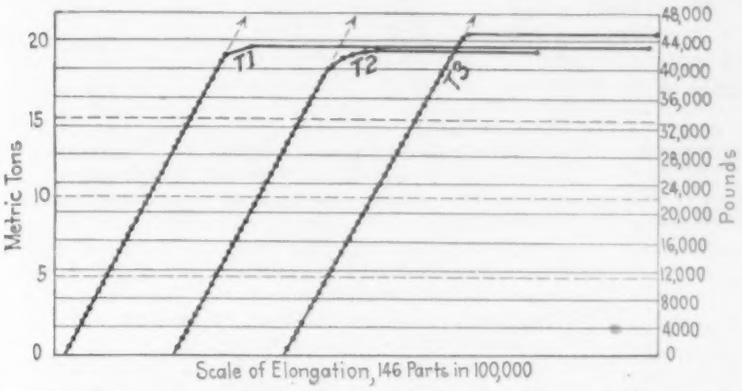


Fig. 27—Tension Tests of Semi-Hard Steel with Test Pieces of 614 sq. mm. (0.952 sq. in.) Sectional Area (but *T2* Was of 615 sq. mm. or 0.953 sq. in.). The results were:

Load at limit of proportionality:	*T1*	*T2*	*T3*
In kilograms	18,750	18,500	20,250
In pounds	41,350	40,800	44,650
Limit of proportionality:			
In kg. per sq. mm	30.5	30.1	33.0
In lb. per sq. in	43,370	42,800	46,925
Elongation in per cent at limit of proportionality	0.149	0.146	0.164
Modulus of elasticity in tension:			
In kg. per sq. mm	20,400	20,600	20,100
In thousands of lb. per sq. in.	29,000	29,300	28,600

Remarks

About the Bending and Shearing Tests.—After Mr. Fremont's examination on the bending and shearing tests, it would be useless to make new determinations. However, some persons who consider semi-steel as a separate material, in the constitution of the chemistry of castings, might not dare to extend to semi-steel his conclusions relative to the correspondence between the results of the shearing and bending tests. To establish this point, we have made a certain number of determinations and now give in Fig. 25 some examples in a shearing diagram, and in Fig. 26 a graphical representation which shows the correlation existing between the results.‡

These two tests for semi-steel adhere to the original importance which was pointed out for castings in general by Mr. Fremont.

Limits and Modulii of Elasticity under Tension and under Compression of Semi-Hard Reheated Steel.—To be able to draw general conclusions about the deformations at the firing start of the shells, we have proceeded with semi-hard steel to establish data identical with those which have been brought forth for semi-steel, relative to the comparison of the elastic characteristics under tension and under compression.

The semi-hard steel which was used came from the same semi-hard bar of steel, of the variety 56 kg. per sq. mm. (79,600 lb. per sq. in.) in the reheated condition. The absence of segregation had been verified by micrographic examinations. The test bars (of the type of Fig. 15, page 472, Aug. 23) were heated together at 850 deg. C. (1562 deg. Fahr.), after rough turning in a lathe. By examining the bar anyone can make sure of the homogeneity and identity of hardness of the test bars.

The experimental conditions are exactly the same as those described in the foregoing. The numerical results of the test are summed up in Table III (next page) and the curves of deformations reproduced by Figs. 27 and 28.

The moduli of elasticity have the same value at tension and at compression. It can be said that they are practically the same for the apparent limits of elasticity, as well as for the limits of proportionality, which are determined by figuring the longitudinal deformations at about

$$\frac{1}{50{,}000}$$

of the length of measure.

The results of establishing the data on the elastic characteristics at tension and at compression, for steel and semi-steel, have been useful, having brought to us the interpretation of the tests of shells, and the rôle played by those tests, and in clearing up conceptions rather far removed from the ones currently admitted.

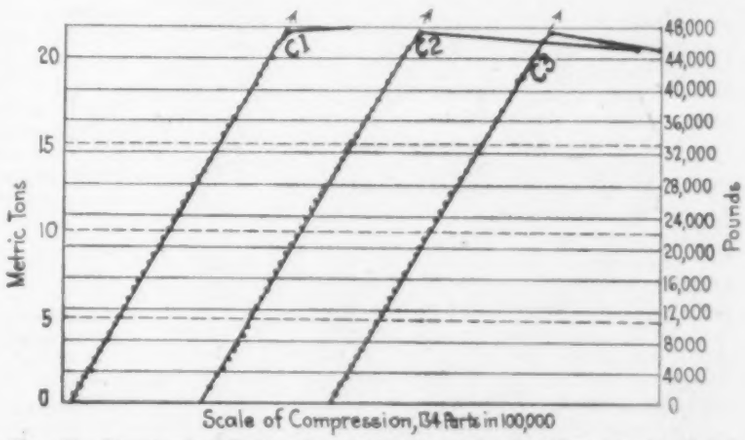


Fig. 28—Compression Tests of Semi-Hard Steel with Test Pieces of 615 sq. mm. (0.953 sq. in.) Sectional Area. The results were:

Load at limit of proportionality:	*C1*	*C2*	*C3*
In kilograms	20,500	20,500	21,000
In pounds	45,200	45,200	46,300
Limit of proportionality:			
In kg. per sq. mm	33.4	33.4	34.1
In lb. per sq. in	47,500	47,500	48,500
Contraction in per cent at limit of proportionality	0.161	0.162	0.166
Modulus of elasticity in compression:			
In kg. per sq. mm	20,700	20,600	20,500
In thousands of lb. per sq. in.	29,435	29,300	29,150

Table III—(Mechanical Characteristics of Castings)

Mechanical Tests of Tension and Compression on Semi-Hard Steel at 56 kg. per sq. mm. (79,600 lb. per sq. in.)

Nature of Test	Mark of the Test Bar	Limit of Proportionality kg/mm²	Apparent Limit of Elasticity (1) kg/mm²	Load at Rupture Under Tension: Maximum Load Applied kg/mm²	Deformations Under the Maximum Load Applied: In Length at the Limit of Proportionality %	Deformations Under the Maximum Load Applied: In Length %	Deformations Under the Maximum Load Applied: In Section (2) %	Module of Elasticity kg/mm²
Tension	T 1	30.5	32.2					
	T 2	30.1	32.1	40.7	0.149	2.9	2.4	20,400
	T 3	33.0	33.6	40.6	0.146	3.2	2.4	20,600
	Mean	31	32.6	40.7	0.164	2.9	2.6	20,100
Compression	C 1	33.4	34.8	40.7	0.15	3	2.5	20.5×10^3
	C 2	33.4	34.3	81.4	0.161	12.0	17.9	20,700
	C 3	32.1	35.3	81.4	0.162	11.6	15.4	20,600
	Mean	33	35	40.7	0.166	1.1	2.3	20,500
				...	0.16	...	...	20.6×10^3

(1) Shown on the diagram registered by the testing machine.
(2) Measured at the mid-length.
(To convert kg./mm² into lb. per sq. in., multiply by 1422.)

PERMANENT MAGNET STEELS*

Suggested Specifications for Various Grades and Uses

BY ELLIS H. CRAPPER

PRONOUNCED demand for permanent magnet steels for magneto-magnets, other than those required for telephone sets, has brought into prominence the necessity for grading such steels into ordinary and special brands of permanent magnet steels. During the last ten years the electrical engineer has evolved designs resulting in the production of magnetos of superior quality and reliability, and has been materially assisted by the metallurgical engineer, who has provided permanent magnet steels of the required quality.

It appears to the writer that the time has arrived when it is not only possible, but essentially necessary, to grade such steels. The following suggested specification is consequently offered tentatively as one which makes reasonable demands upon the steel maker and, with the exception of one or two specific magnetic constants, nothing is introduced that cannot be readily understood by those acquainted with the elementary principles of the magnetic circuit, and the graphical representation depicting the results of magnetic tests in the form of the complete hysteresis loop. Such a diagram gives the relationship existing between the resulting values of the flux-density B, as the magnitude of the magnetizing force H is varied and reversed between the definite maximum values.

For the purposes of the design of ordinary dynamo-machines, in which magnetically soft iron is utilized, the relationship existing between the flux-density B and the magnetizing force H is perfectly definite, and the application thereof is a simple matter. But in the case of the magnetically hard materials of which permanent magnets are made, the constant B is not so definite as a criterion of the nature and value of the steel for purposes of design.

The constant I, technically known as the intensity of magnetization, or the magnetic moment per unit volume, is given by the well-known relationship, $B = 4\pi I + H$, and it is suggested that the magnetic element which best specifies the inherent magnetic nature and quality of a permanent magnet steel is $I = \frac{B - H}{4\pi}$ For some purposes $4\pi I$ or $B_i = B - H$ (which is obviously the ferric inductivity of the material), is perhaps the magnitude which specifies the quality and condition of the material.

The values included in the table are suggested as a basis for comparison, and the values given for the coefficient of retentivity will obviously be found to differ slightly from the values generally quoted, in consequence of using B_i instead of B. The remanent flux-density, $B_{rem} = 4\pi I_{re}\, m$.

Steels for permanent magnets are, for the purpose of this specification, divided into three grades, denominated:

I. Ordinary grade permanent magnet steel.

II. Higher grade magneto-magnet steel.

III. Special grades of permanent magnet steel.

*From *Engineering* (London).

I. The ordinary grade magnet steels include plain carbon and chrome steels as well as tungsten steel, suitable for the manufacture of permanent magnets which will not be subjected to vibration, shock or rough usage. These steels, when properly treated thermally and tested ballistically in the form of a closed magnetic circuit, should possess magnetic characteristics or constants superior to the minimum volumes in column I of the table, when the maximum value of the applied magnetizing force $H_{max.}$ is not less than 400 C.G.S. units.

II. The higher grade magneto-magnet steels include special chrome steels, tungsten steels and chrome-tungsten steels of such composition as will meet the requirements of magnetos intended for use with internal-combustion engines associated with motor, sea-craft and aircraft services. The specific requirements for these services are a high degree of constancy of the magnetic characteristics, as well as higher values of the magnetic constants, than those of grade I.

The minimum acceptable values, when tested under the specified conditions, are given in Column II of the table.

III. The special-magnet steels include the more recently introduced cobalt steel and chrome-cobalt steel alloys, which are characterized by exceptionally high values of coercive force H_c, and satisfactory values of remanent flux-density and other magnetic constants. The tests for these steels must be made with magnetizing forces of which the maximum value, $H_{max.}$, is not less than 1500 C.G.S. units.

These steels should be easily worked, and not liable to crack unduly in the making and hardening processes. The minimum acceptable values of the magnetic constants of these steels are given in Column III of the table.

	I	II	III
Coercive force, H_c in C.G.S. units	58	65	200
Remanent flux-density, B_r	10,000	.....	.....
Remanent intensity, I_r	.....	760	800
Coefficient of retentivity, $c = \frac{B_r}{B_{i\,max.}}$	0.65	0.7	0.625
The product, $H_c \times c$	40	50	125
Magnetic strength, $H_c \times B_r$	56,000	600,000	2,000,000
Specific reluctivity at the remanence-point, $\frac{H_r}{I_r}$	0.07	0.085	0.25
Available external magnetic energy $(\beta\phi)_{max.}$	240,000	399,000	600,000 to 1,000,000

A resolution declaring "emphatically and unreservedly" against the steel trade practice known as "Pittsburgh plus" was adopted Aug. 28, at the annual convention of the National Association of Attorneys General at Minneapolis, Minn. The resolution declared that the "plus" plan was "unjust and uneconomic" and pledged the organization's support in the campaign being waged against it.

The first International Motor Transport Congress in the United States will be held in Detroit, May, 1924. The congress is under the auspices of the National Automobile Chamber of Commerce. It is to last four days, during which time subjects of direct bearing on the economic development of international motor transport will be discussed.

The "Stainless" Metals of Commerce

A Discussion of Their Properties and Heat Treatment—Large Possibilities in Iron-Chrome Complex—The Place of Non-Ferrous Alloys

BY J. KENT SMITH*

EVEN the casual student of metallurgical history must have been struck by the changes in nature of the demands made upon commercial metals during the last decade or so. The patient research of hundreds of metallurgists has succeeded in a large number of these cases in fulfilling demands; in fact, the revolutionary work of the last ten years may be said at this time to have brought us to the shore of a new metallurgical continent in which vast regions for exploration exist. Results have not been attained by any mysterious means, nor has the worker possessed of real insight attempted to run up against any natural law. For when the wise man finds and recognizes that he is up against a natural law he quits without wasting any more time. If he recognizes some fundamental attribute as appertaining to a particular element which forms the base of his work, he does not waste time in attempting to develop properties from it which he knows cannot inherently be there. Rather he seeks in the first place a suitable compound with that element of another element, from which compound all manifestations of the attribute shall have vanished. This modification he then uses as a base upon which to build.

Persistence of Old Nomenclature

Of the discoveries which have been made and developed during the last portion of the present generation none is more striking than the so-called "stainless" metals. Already in these pages the writer has deprecated the name, in which accuracy has been sacrificed to brevity. As it stands, the interpretation of the name by the technologist is severely limited mentally. The danger of confusion is not so much in the present, perhaps, as in the future. A typical instance is very familiar to us in steel nomenclature. Less than half a dozen generations ago every pound of steel made in the world was manufactured by processes all calling into requisition for their performance temperatures far below the melting point of the steel itself; that is, by practice of a cementation process, followed by the repeated piling, welding and subsequent shaping of the carburized product. Nor is this plan of procedure extinct even today. In unexpected parts of Sheffield old converting furnaces still rear their heads and are in active, if restricted, operation.

Then Hunstman of Attercliffe introduced to our forebears of the period his process for producing homogeneous steel by melting it. He cast the fluid mass into ingots, which were then reheated and hammered out to the shapes required—mainly, be it noted, for the manufacture of tools. His melting was always done in crucibles, and his product became known as "cast steel." Today the trade use of the name "cast steel" signifies only the steel product of the crucible; yet the steel products of the crucible form but a tiny fraction of the total products of the steel industry, practically all of which have been cast from a fluid condition. Which points the advisability of care in the bestowal of a name.

There are many variants of "Stainless" metals now familiar to us, and fresh ones are being brought before our notice frequently. Obviously the first classification of them which leaps to the eye is their grouping as ferrous or non-ferrous. In other words, by the first we mean those "Stainless" metals of which iron forms the primary constituent, and by the second those metals in which iron occurs only as an impurity, more or less—and an innocuous one at that. Between the two lies a "no man's land" occupied by a group of metals containing a considerable—but by no means preponderating—proportion of iron, which iron has but little metallurgical significance. The commercial exposition of this type of metal is almost entirely centered round the nickel-chromium-iron alloys—generally known as the Nichrome metals—of which many trade variants are now on the market.

What "Stainless" Implies

The description "stainless" as applied to a metal refers to one whose polished surface neither corrodes nor dissolves in the circumstances of its legitimate use, nor takes to itself in such use any marking whose removal requires solution or abrasion other than that involved in its wiping with a damp cloth. Such description embraces the phenomena of rusting, pitting, marking by food acids, and atmospheric tarnishing. As is reasonably to be expected, the main research began among the ferrous alloys, its definite object being in the first place to preserve them from the attacks of their age-long and powerful enemy—rust. It early became quite evident that the only effectual means of combating this must be made inherent in the metal itself. Previously most attempts had been directed toward the finding and application of some protective coating. Obviously no protection of the surface only could be thoroughly effective. The moment that such surface was disturbed or destroyed—possibly even by scratching it—chemical action would begin between the portion of metal left unprotected and the exciting agent, and the last state would possibly be worse than the first.

Again, a dozen years ago, the efforts of the scientific investigator were directed to the known steels, which had simple iron as their base. Complete deoxidation of the magma forming the base, its greater or less denitrogenization, and the solid solution in it of small amounts of extraneous elements such as copper, led to some retardation of rusting. Certainly any measures such as these did not eliminate rusting, nor in the nature of things could they.

In order to make the reason clear it may be permissible here to reiterate certain simple truths. But it is

(*Continued on page 650*)

J. KENT SMITH, metallurgist of Sheffield, England, received his training in chemistry at Liverpool and entered the steel industry in connection with special experimental work. He spent ten years subsequently in the industry in close practical investigation of the problems of tin plate, seamless hydraulic tube drawing, coal gasification and by-product work. He directed his attention early to the alloy steels and their development, coincidently with the early developments in the automobile industry. Twenty years ago he was known in England as "the automobile metallurgist," and a few years later made a considerable stay in the United States introducing vanadium steel in automobile manufacture. His work on vanadium and his writings in that connection are well known on both sides of the Atlantic. Mr. Smith was made an officer of the British Empire in recognition of his metallurgical services to England in the world war.

ROLLING BROAD-FLANGED BEAMS*

Limitations of the Mill and Use of Vertical Rolls—Layout Best Adapted to Success

BY K. RAABE

IN the Grey mill at Differdingen, for rolling broad-flanged beams, the plant consists of a blooming mill, an intermediate mill and a finishing mill, as shown in Figs. 1 to 3. The ingot is first rolled down into an H-shaped bloom with a web from 7 to 12 times the thickness of the web of the finished section. The bloom is then further rolled down in the intermediate mill, consisting of two pairs of rolls, in which the web is

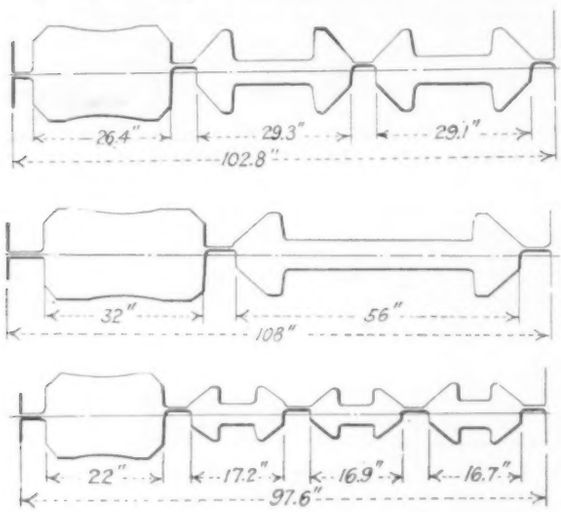


Fig. 1—Blooming Rolls for Broad-Flanged Beams. Upper view is for 40-in. beams; middle view, for 18-in. beams; lower view, for 8-in. beams

reduced to 1¾ or 2 times the finished section. The steel is finally passed through the finishing mill, consisting of a pair of horizontal and one pair of vertical rolls. On the return pass the web is kept in a vertical position when passing through the first stand.

When perusing the literature relating to the rolling of broad-flanged beams two points stand out:

(1) Very little is said about the blooming mill, showing that not much importance is attached to the manner in which the ingot is roughed down. This is a mistake, and there is no doubt that in future more attention will have to be paid to the blooming mill.

(2) It is held that all sections from 140 to 1000 mm. (5½ to 39⅜ in.) deep can be, and are usually, rolled in the same finishing mill. As a matter of fact, it would never occur to the mill foreman to roll all ordinary standard sections on one and the same mill, although the series in this case consists of fewer sections than that of broad-flanged beams.

With the blooming mill, there are two main fundamental principles to be observed: (1) The plant must be arranged so that it should be possible to finish the section at a good heat. (2) The ratio in the cross-sectional areas of web and flanges of the finished product should be reached at as early a stage as possible during rolling, and should always be adhered to in subsequent stages.

Bearing in mind these two points, the usual type of blooming mill, with rolls 1100 mm. (43 in.) diameter and a prime mover of 6000 to 8000 hp., is not suitable for a modern type of special girder mill. The standard ingot as used on the ordinary type of blooming mill weighs from 3 to 5 tons. A 5-ton ingot 6 ft. 6 in. long has a mean cross-sectional area of 576 sq. in. For rolling a broad-flanged beam 1000 mm. (39⅜ in.) deep, it would be necessary to have an ingot 1500 mm. (59 in.) wide weighing 12 tons, and for a broad-flanged beam 400 mm. (15¾ in.) deep, an ingot exceeding 40 in. in width and weighing 8 tons.

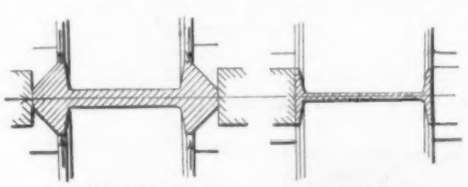
It is obvious that it would not be possible to roll down quickly enough in an ordinary mill an ingot of the dimensions required to produce a beam 40 in. deep. Reductions of more than 15 mm. (0.6 in.) are impossible if the rolls are not to break or the engine is not to be stalled. For beams 16 in. deep the maximum reduction must not exceed 20 to 25 mm. (0.8 to 1 in.). It is essential to be able to roll the ingot for heavy sections at average reductions of 30 mm. (1.2 in.) and for medium sections at 50 mm. (2 in.).

Fig. 1 shows the rolls for broad-flanged beams 40 in. deep. As will be seen, this particular blooming mill has a shaping and an up-set pass. The body length of these rolls is 108 in., but, when dealing with beams of less depth, it is possible to arrange two or three shaping passes and one or two up-set passes. If it were desired to effect a reduction of 30 mm. (1.2 in.) with this roll, a roll diameter of 64 in. would not be large enough. On the other hand, to reduce the weight of the rolls, the up-set pass would have to be dispensed with. By doing this, there is the advantage that the blooming roll would not exceed 6 ft. 6 in. in length, and a diameter of 56 in. maximum would be sufficient to produce the desired reduction. The prime mover would have to develop 12,000 to 15,000 hp.

But there are other and more important reasons for dispensing with the up-set pass. As already stated, the ingot for a broad-flanged beam 40 in. deep has a width of 59 in. Since the shaping pass is only 56 in. wide, the bloom, end up (Fig. 4) must first be reduced to the requisite width in four passes, then laid on its side and the rolling in the shaping rolls begun. As the bloom has to be reduced in the shaping rolls by about 330 mm. (13 in.), some 23 passes are necessary.

While doing this the bloom must be squeezed down, end on, at least twice and sometimes even more often. For each up-set pass the bloom must be up-ended, and given one pass to and fro, then laid down on its side and passed through the rolls again. This takes a great deal of time and results in much loss of heat in the bloom. Hence it is impossible to comply with the first fundamental principle as regards temperature. This disadvantage is not so obvious, of course, in beams up to 18 in. deep, while in the smaller sections it practically does not exist.

A mill must, however, be so designed as to be able to deal with all sections. Dealing first of all with the heavy sections, the up-set pass must in this case be done away with. To take its place the blooming mill should be designed as a special mill with a pair of cylindrical, vertical rolls, capable of horizontal adjustment, both at the back and in front of the



First Pass Last Pass

Fig. 2—Intermediate Mill

blooming rolls, each pair of these vertical rolls being capable of being put out of action by mechanical means at will. This arrangement is shown in Fig. 5, as is also the shape of the blooming rolls.

In this arrangement the two vertical rolls (which are driven) in front of the blooming rolls would seize the bloom and force it through the horizontal rolls. The bloom would then pass through the rear vertical rolls, which now run idle but are so adjusted as to compress the bloom. On returning, the bloom would be sized by the rear vertical rolls (which are now driven) and be flattened out somewhat by the horizontal rolls, and then compressed in the front pair of vertical rolls, now running idle but set tighter, so as to compress the section slightly. In this way the beam would be rolled out wider during each passage through the horizontal rolls.

This rolling out is of great importance. Where a bloom is not properly up-set during its numerous

*Translated from *Stahl und Eisen*, by *Iron and Coal Trades Review*, London, England.

(*Continued on page* 652)

CONTENTS

September 6, 1923

Savings Effected in New Radiator Plant 591
Emphasis on Minimizing Numbers and on Special Skill of Workers Has Resulted in Equipment and Design of Unusual Originality.

Lungyen Blast Furnace Plant Near Peking 598
Power Plant Equipment and Use of Furnace Gases—Special Settling Arrangements Needed to Avoid Trouble from Loess in the Water Supply

Position of Tin Plate Makers Explained 603
Vice-President Davis of American Sheet & Tin Plate Co. Answers Complaints and Says Some Proposed Changes Could Not Be Adopted

Mechanical Characteristics of Castings 610
Examination of Semi-Steel Tensile and Compressive Strength, Elasticity and Shearing Resistance, Compared with Its Hardness—Semi-Hard Steel

The "Stainless" Metals of Commerce 615
A Discussion of Their Properties and Heat Treatment—Large Possibilities in Iron-Chrome Complex—The Place of Non-Ferrous Alloys

Iron and Steel Papers at Montreal 621
Program Important, But Final Sessions of Mining Engineers' Meetings Are Meagerly Attended—Discussions on Zirconium, on X-Ray Test of Steel, etc.

Japan Offered Aid by American Steel Trade 623
Preferential Consideration to Be Given for Steel Needs—Many Emergency Inquiries but Real Buying Months Away—Relief Measures the Call of the Hour

August Pig Iron Output Lower 628
Smallest Daily Rate Since February—Decline of 7840 Tons per Day from July—Total Was 3,435,313 Tons

President Coolidge's Position on the Tariff 654
Believes Business Should Not Be Unnecessarily Disturbed—Increase Proposed on Pig Iron and Decrease on Magnesite Under Flexible Provision of Law

Russia Slowly Improving in Iron and Steel 656
Production Increases as Communistic Methods Are Abandoned—Ural District Sells to Manchuria—New Currency Gradually Replacing Paper Rubles

Electric Steel in China 597
Electric Borer for Pattern Shops 601
Malleable Castings in July 601
Gear Testing Machine 602
Fence Manufacturers Simplify Program. 602
Heat Treatment of Carbon-Vanadium Steel for Forgings 602
Labor-Saving Use of Cranes 604
Era of Educated Workman 606
Zirconium in Steel 607
McKune Open-Hearth Furnace 608
Vulcan Mold & Iron Co.'s New Plant 608
Production Drilling Machine 609
Low Platform Truck 609
Permanent Magnet Steels 614
Rolling Broad-Flanged Beams 616
Editorials 618
The Calamity in Japan—Light Alloys, Present and Future—Steel Production and Exports—The Coal Strike and Coal Supply—What of Russia?—Zirconium and Phosphorus

Correspondence 620
Pearlitic Cast Iron
Marting Company Installs Three Shifts.. 622
Japan's Trade at Standstill 625
Railroads Protest at Decrease in Rates... 626
Manufacture of Fire Clay and Silica Brick 626
Improvement in France 627
Proposed Reduction of Rate on Steel Products to Texas 627
Puddling Rate Unchanged 627
Coming Meetings 641
Fabricated Steel Business 644
Railroad Equipment Buying 644
German Iron and Steel Market 645
Blast Furnaces Stopping 646
British Iron and Steel Market 648
New Trade Publications 651
British Foreign Trade 655
Community Effort in Locating New Industries 656

Iron and Steel Markets 630
Comparison of Prices 631
Prices Finished Iron and Steel f. o. b. Pittsburgh 642
Prices of Raw Materials, Semi-Finished and Finished Products 643
Non-Ferrous Metal Market 645
Personal Notes 647
Obituary Notes 647
Machinery Markets and News of the Works 657
New York Jobbers' Prices 664

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY WILLIAM W. MACON GEORGE SMART

C. S. BAUR, *General Advertising Manager*

Member of the Audit Bureau of Circulations and of Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President* PRINTED IN U. S. A. George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Swetland, *Pres.* Charles G. Phillips, *Vice-Pres.* A. C. Pearson, *Treas.* F. J. Frank, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1420-1422 Widener Building. Cleveland: Guardian Building Detroit: 317 West Fort St. Cincinnati: First National Bank Bldg. Buffalo: 833 Ellicott Square. Washington: 26 Jackson Place, N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 per year. Single copy 25 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

The Calamity in Japan

In the disaster that has overwhelmed Japan the American impulse to help has found expression in the starting of a relief fund that may be expected to mount quickly into millions. It has been hard under the conditions that have prevailed for years, fostered by jingoes in both countries, to get a true measure of the feeling of friendliness for Japan that exists in the United States. Now there will be no bounds to the sympathy of the American people. Nor can we doubt that from this most appalling visitation of the destructive forces of nature in all history will come such an outgoing of good-will as shall insure peace between the two nations, not only for our time but for the generation to come.

From the material viewpoint the catastrophe seems a picture of unrelieved loss—so many hundred thousand lives taken, so many hundred millions in property destroyed. But humanity has such a way of gathering courage in misfortune and of rising out of desolation which seems to hold no germ of hope, that time may be counted on again to be the miracle worker.

The story of destruction is still untold, and barely hinted at, but already men are busy with plans of reconstruction. In a single sentence one of her journals cables that Japan's material progress has been set back a generation. But that judgment will be revised not many days hence, when we shall be hearing that plans for a greater Japan are already under way and that to that end the moral and material encouragement of the people of the United States has been offered without stint.

Light Alloys, Present and Future

The recent launching of the great navy airship, Z R 1, is an impressive reminder of the advance that has been made in the metallurgy and the fabrication of light alloys. A massive cigar-shaped frame, 680 ft. long and 79 ft. in diameter at its largest section, has been fabricated of an aluminum alloy only a little more than one-third the weight of steel but having the strength of mild steel. The entire structure contains only about 15 tons of metal and yet in size it approaches some of the modern ocean liners. Progress in the metallurgy of light alloys and advances in their rolling and heat treatment have made possible this spectacular achievement. The difficulties in the manufacture of this particular alloy have been mastered in large measure and assurance is given that the perfecting of heat treatment has made it more resistant to fatigue strains.

Other light alloys, particularly those in which magnesium is the base, are being much improved. Some of these are lighter than the aluminum alloy referred to and possess nearly the same physical properties. The efforts of Henry Ford to get control of hydroelectric power in various localities point to the greater use of light alloys in the automobile industry. The all-aluminum or light alloy car is more than a possibility.

Only the problem of more economical methods of manufacture of all such metals and alloys stands in the way of their wider use. They have contributed much to the triumphs of heavier-than-air flying machines, whose real usefulness is only in its beginning. In the opinion of a leading American metallurgist, if the amount of steel used each year be divided by the total of light alloys, the quotient is destined to become smaller and smaller with every passing year.

Steel Production and Exports

Our iron and steel exports have been showing no definite trend upward since the collapse of the 1920 boom. During the war they ran somewhat above 5,000,000 tons a year and in the first two post-war years between 4,000,000 and 5,000,000 tons. Since then, or for two and a half years, the rate has been, roughly speaking, about 2,000,000 tons a year. For the first half of this year the total was only slightly above that for the second half of last year, while it was below that of the first half by a larger amount. In July of this year, the last month reported upon, the movement was 4 per cent above the average of the six months preceding, but 8 per cent below the average of the three months preceding.

While our exports have varied but little in the

past two and a half years our domestic production has varied greatly, the domestic customers of the steel mills being much less regular in their purchases. To the many proofs already in the statistical record, another has been added, that we cannot even in a small way make up for a light domestic demand by exporting steel.

With the rate of export not materially changed, but with record high production, steel exports in the first seven months of this year represented a lower percentage of the current production than has been shown for many years. In these seven months the so-called "total iron and steel exports" amounted to 1,141,559 gross tons. In this total are scrap, pig iron, semi-finished steel, rolled steel in general, cast and wrought pipe, etc. Various details as to exports were given in THE IRON AGE of last week, page 538. Deducting from this total the pig iron, ferromanganese, scrap, iron bars, castings, etc., there is left 1,060,000 tons, which may be regarded as rolled steel. Our total production of rolled steel runs about 75 per cent of our ingot production, and accordingly about 1,410,000 tons of ingots was represented, which is 5.3 per cent of the 26,729,209 tons reported as the ingot production of the seven months. This is the smallest percentage for many years. Practically every year 1912 to 1920 inclusive the proportion, similarly computed, ran above 10 per cent.

It is true we export a considerable quantity of steel in the form of machinery, with weight not reported, but on the other hand the exports of pig iron and iron castings are practically nothing compared with our production of foundry iron and the same is true of rolled iron.

The Coal Strike and Coal Supply

The statistical position of coal, now that the anthracite suspension has begun, may be summarized briefly. The production of anthracite in the present coal year, since April 1, has been very large, and there are fairly large stocks of bituminous coal.

The curve of anthracite production was a constantly ascending one until in the calendar year 1911 90,464,067 net tons was produced. In the two war years, 1917 and 1918, nearly 100,000,000 tons was produced, but with the exception of that period the production has been below that of 1911 more often than above. It may be taken, as a general principle, that production of anthracite has been stationary for a dozen years, apart from seasonal variations, at 90,000,000 net tons a year. As consumption of fuel in the territory served by anthracite a dozen years ago has been increasing it is evident that a process of substitution has been in progress, and even in a not very pressing emergency such substitution can be forced further without much difficulty.

Production of anthracite in the five months of the coal year, April 1 to Aug. 31, has been about 42,400,000 tons, or 47 per cent of a normal year's total. Whatever the "stocks" at one point or another, the amount of unburned anthracite above ground is large.

Coming to bituminous coal, the Geological Survey has just reported an estimate of stocks, Aug. 1, of 51,000,000 tons, increases having been 4,000,000 tons in June and 5,000,000 tons in July. Stocks Sept. 1 may be guessed at 56,000,000 tons. Maximum stocks reported were 63,000,000 tons, both on Armistice Day and on April 1, 1922. Never except on these two occasions was there nearly as large a stock as 56,000,000 tons. The studies made by the National Association of Purchasing Agents, referred to in THE IRON AGE of last week, page 540, would indicate somewhat larger stocks than stated by the Geological Survey.

As to bituminous coal production possibilities, the majority of districts are now assigning their lost production to "no market." It would be misleading to cite the large percentages of loss thus assigned, because a small increase in demand might throw the lost production into the "transportation disability" or "labor shortage" column, and in turn a slight increase in car supply or man supply might throw the loss into the other column. There are, however, production possibilities of no small consequence. Aside from these various coal marketing districts, the Connellsville region will be able to supply very considerable amounts of coke.

What of Russia?

Travelers, senatorial and others, return from Russia with words of quasi-wisdom. The Bolshevik Government has found itself and is a wonderfully efficient thing. The people are becoming happy. They are going to export grain. Etc., etc. Others dissent. In truth nobody knows what they are talking about. The daily papers publish interviews with them, for even the words of an ass may be news. The editors offer neither endorsement nor criticism. It's all the same to them.

We laugh at the foreigner who comes to the United States, makes a hasty transcontinental trip, and essays to size up our economic position. We have some trouble in that sizing up ourselves! What, then, of the casual traveler in Russia, who knows neither the language nor the mysteries of a strange people? The expert sitting in London or New York, getting many reports and studying data, knows far more.

Russia is in ruins. Its railroads are in deplorable condition. Its heavy industries are all but wrecked. There is some production in the light industries, which have passed back into private control. The peasants have things in about their own way. The Bolsheviks have taught them to pay taxes. That's all. The harvest will be better this year than last. Probably there is no danger of famine. But Russia will not be an exporter of grain. Absurd to think it. Well, then, what is going to happen politically and economically? They are much the same thing.

Communism was admittedly a failure. Then was substituted the "new economic policy," or state capitalism. That also is a failure: Even the virile Trotzky says pitifully that private enterprise used to operate industry profitably but the

Government cannot do it. Back to straight capitalism is the next thing. The Bolshevik Government is already close to the end of its rope. The reign of terror is ended. Already is the new revolution developing strongly and swiftly. It still lacks coherence, lacks leadership. It does not show on the surface. It is like the sap spreading up through a tree. Some day the new thought will bud over night, as a tree buds in spring. It will seem sudden, but will not be really so. The red Government will simply step out and a moderate one will step in. This may be a year hence, may be two years. Who can time such things closely?

What after that? Russia is essentially an agricultural country. We know that such countries can recuperate quickly. Russia is rich in natural resources. It is not unreasonable to expect that within five years after the change of government, barring agricultural adversities, Russia may become the most prosperous country of continental Europe.

There are many confusing conditions entering into consideration. In the beginning the Bolsheviks stupidly set out to annihilate management, the intelligence of the country which they associated with capitalism. After slaughtering hundreds of thousands they awoke to the realization that if they kept on with such extinction nobody would be left to direct industries. By that time they had come to appreciate that the proletariat and peasantry did not know how and could not learn. It will remain for time to show whether with the recovery from that madness they saved enough of the brains of Russia.

In a country like the United States such a loss would be fatal. It would spell the downfall of our civilization. In a backward, essentially agricultural country like Russia it may not be so serious. In our optimistic forecasts we give expression to that thought.

There may be even an important offsetting thing in the knowledge gained by millions of peasants while they were prisoners of war in Germany, who were put mainly to work on the farms and thus had the opportunity to see that steel plows are better than a crooked stick and that iron-shod wheels are an improvement upon those of wood alone. Such knowledge has now spread all over Russia. Life in the army, too, created new desires, such as that for sugar with which the soldiers were supplied, and which they found to taste good. In rejuvenated Russia the people may want to work hard in order to get new things.

Zirconium and Phosphorus

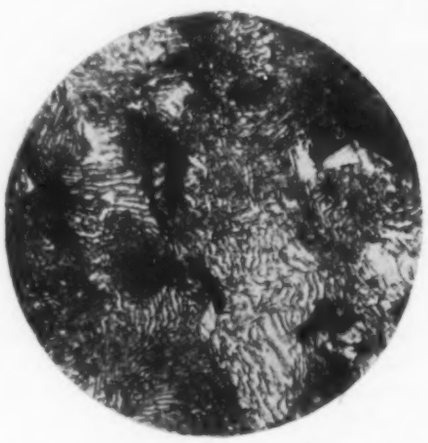
Several months ago announcement was made in these columns of some remarkable results from the use of zirconium in the manufacture of steel. Its scavenging capacity and the notable effects in the presence of sulphur were prominent. Another chapter has just been added to the story of zirconium. Elsewhere are given extracts from a paper read at the Montreal meeting of the mining engineers last week, discussing the effects of this metal on phosphorus in steel. It has been found that there is essentially a neutralization of the embrittling effect of phosphorus, or that after zirconium treatment the Izod impact values of steels containing about 0.14 per cent phosphorus are markedly superior to those for untreated steel of the same composition.

If these results can be regularly duplicated in commercial practice, their practical value is manifest. It means not only that higher phosphorus steel can be used more extensively, but also that in rail manufacture the phosphorus problem is simplified, for in rails a metal is needed as resistant to shock as possible. If the expectations of the investigators are realized, many of the troubles incident to the presence of phosphorus and sulphur, particularly the latter, will disappear or be lessened, so that ores now regarded of little value may become available. There might even follow eventually some modifications of steel specifications.

CORRESPONDENCE

Pearlitic Cast Iron and Microscopy in the Foundry

To the Editor:—We have read with much interest the article on "Pearlitic Cast Iron," which appeared in your Aug. 16 issue. We are taking the liberty of calling attention to the fact that the type of iron described



Photomicrograph of True Pearlitic Cast Iron. Etched with picric acid, 500 diameters

is that considered best, in so far as metallic matrix is concerned, by most metallurgists, and for certain sections such iron is being produced commercially without using special molds. As you know, the rate of cooling and the composition are the major factors influencing the structure of the iron. It has been shown that in sound metal the structure determines the physical properties. Various devices used for controlling the rate of cooling (such as the molds mentioned, chills, size section, pouring temperature, heat treatment, etc.), are in a general way capable of producing the same changes of structure more commonly secured by means of changes in composition. Production of a "pearlitic" matrix, while important, is not the only essential in producing high quality metal, the nature of the graphite size and distribution exerting an even more profound influence. This, we may say, has been amply demonstrated by the researches carried out in the Niles laboratory of the Niles-Bement-Pond Co.

The statements relative to the practical value of microscopy are true, if they are meant to imply that microscopy is not generally used in gray iron work. There are a number of firms which have found microscopy a valuable aid, and in this laboratory we consider it the best of the tools we have when used for solution of everyday foundry problems. Indeed, one of the most practical of methods for getting a line on the physical properties in the casting, as in heavy machine tool castings, is microscopic examination. It would be more satisfactory to include microscopic specifications for certain types of castings than specifications for analysis and physical tests.

We are inclosing a micrograph (500 diameters, etched with picric acid) of a true pearlitic cast iron, as regularly produced here. The following are two typical analyses of this type of iron:

Sil.	Mang.	Phos.	Sul.	C. Carbon	Total Carbon
1.08	0.59	0.37	0.134	0.80	3.28
1.17	0.56	0.41	0.133	...	3.34

J. W. BOLTON.
Metallurgist Niles Tool Works Co.

Hamilton, Ohio, Aug. 23.

Iron and Steel Papers at Montreal

Program Important, but Final Sessions of Mining Engineers' Meeting Are Meagerly Attended—Discussions on Zirconium, X-Ray Tests of Steel, Effects of Nitrogen and Chrome-Iron Alloys

IT is more than unfortunate that a large technical organization should schedule an important program of papers on new developments in steel at a summer session which, under ordinary circumstances, would be but sparsely attended by those interested in the subjects discussed. The American Institute of Mining and Metallurgical Engineers closed a ten-day mining excursion to various localities in Canada with technical sessions at the Mount Royal Hotel, Montreal, Canada, on Thursday, Aug. 30. Besides two sessions on mining and milling and on geology, there were scheduled morning and afternoon meetings on iron and steel at which the following program was carried out:

"X-Ray Examination of Irregular Metal Objects," by Ancel St. John.

"X-Ray Examination of Steel Castings," by H. H. Lester.

"Nitrogen in Steel," by C. Baldwin Sawyer.

"Desulphurizing Power of Iron Blast Furnace Slags," by Richard S. McCaffery and Joseph F. Oesterle.

"Effect of Silicon on Equilibrium Diagram of System Carbon-iron, near the Eutectoid Points," by H. A. Schwartz, H. R. Payne and A. F. Gorton.

"Some Commercial Alloys of Iron, Chromium and Carbon in the Higher Chromium Ranges," by C. E. MacQuigg.

"Some Effects of Zirconium in Steel," by Alexander L. Feild.

"Selecting Material for Formed and Drawn Parts," by L. N. Brown.

The trip of the institute ended with about 125 members arriving at Montreal, Wednesday evening, Aug. 29, while at one time the party numbered as many as 200 members and guests. Despite this fairly good representation on the excursion, the iron and steel sessions were practically unattended. The average number of persons present in the morning and afternoon was about eight, with the maximum at 16. The sessions were to be presided over by J. V. W. Reynders, but in his absence William Kelly, Vulcan, Mich., occupied the chair. In noting the small attendance, the chairman said that it was an occasion for congratulation to see so many present because after 10 days of dissipation the "pilgrims" were not in a position to consider abstruse technical subjects.

X-Ray Examination of Steel

At the morning session Dr. H. H. Lester's paper was read by Dr. Ancel St. John. The Watertown arsenal has been making laboratory tests on the X-ray examination of metals, but they are more and more considering this work as being of commercial importance for routine testing. Their practice is to shoot 3 in. of metal 13 in. from the tube, using 195,000 volts and 7 milliamperes.

Doctor St. John explained the difficulties encountered in X-raying with such high voltages—difficulties in insulation, danger from the rays, necessity of parallelism, etc. Increase of power by current intensity shortens the exposure, while increase of voltage increases the penetration, since the penetrating power is a function of the voltage. Doubling the voltage will give about eight times the penetration. Taking the arbitrary figure of 30 min. as the time of exposure, a voltage of 400,000 would allow penetration of 6½ in. to 7 in. of metal. On the other hand, as the penetration increases, the size a cavity must be in order to be detectable also increases, so that it may be said that the flaw which is detectable must be from 1/50 to 1/100 of the thickness of the metal being examined.

The paper entitled "X-Ray Examination of Irregular Metal Objects," which was published largely in full in THE IRON AGE of Aug. 23, was presented by the author. He discussed the difficulty due to X-ray examination of irregular objects, where the contrast is too great between the screened and unscreened portion of the negative. If tungsten is present in the steel, for example, the part of the negative shielded by the specimen may get less than one-millionth the exposure that falls on the unscreened part. The former method of using lead powder is slow and troublesome. By using a liquid higher in absorptive power than the specimen, it is possible to differentiate between defects which are inside or outside of the specimen.

Dr. St. John's paper also points out the possibilities of distinguishing between "blowholes" and "shrinkage cavities." Summing up the two papers, Dr. Lester's shows the present limitations of X-ray examination of metals, while Dr. St. John's shows some useful kinks.

In a written discussion of Dr. St. John's paper, Dr. Lester pointed out that the Watertown specimens were too large for immersion in a liquid, or might otherwise be unsuitable for immersion. They use lead powder imbedded in wax. He also thought that Dr. St. John's method might lead to scattering of the rays.

Dr. Coolidge, General Electric Co., inventor of the famous tubes, in a written discussion of Dr. St. John's paper, said that the author had apparently eliminated the worst limitation of X-ray examination, namely, that due to the shape of the object. He was glad to be able to announce that apparatus will soon be available with 50 milli-amperes and 250,000 volt crest. Under ½ or 1 milli-meter of copper, this gives 15 times the X-ray intensity used by the medical profession.

Nitrogen in Steel

The paper on "Nitrogen in Steel," by Dr. C. Baldwin Sawyer, the Brush Laboratories Co., Cleveland, was presented by the author. A brief abstract was published in THE IRON AGE, Aug. 30. Among the items the author stressed were that the absorption of nitrogen by steel is proportional to the square root of the nitrogen pressure; that nitrogen forms a solid solution up to 0.03 per cent nitrogen; that nitrogen is lost by heating the steel, as in the critical point tests, and that it is similar to carbon in its effect on the equilibrium diagram. The eutectoid is at 1.7 per cent nitrogen. Some of Dr. Sawyer's slides of the nitrogen structure showed a remarkable likeness to carbide.

In a written discussion by James A. Aupperle of the American Rolling Mill Co., it was pointed out that uncertainty exists as to the reliability of some of the

analytical results. He (Mr. Aupperle) stated that nitrogen was reputed to be nine times as embrittling as phosphorus. He had also found that some samples which contained three times as much nitrogen as other samples also showed three times the corrosion loss of the lower nitrogen samples. Speaking of combined nitrogen, he called attention to the fact that some oxyacetylene welds contained 0.04 per cent nitrogen, while electric welds contained 0.16 to 0.20 per cent.

Blast Furnace Slag as a Desulphurizer

Richard S. McCaffery presented his paper, "Desulphurizing Power of Blast Furnace Slags," and discussed the complex models which had been constructed to visualize the relationships found between the chemical and mineralogical constituents. He stated that it would take at least 10 years to complete the investigation of the constitution of the slags in certain regions, but that the work already had served to clear up and explain some of the inconsistencies of metallurgical writers concerning the behavior of magnesia and alumina. His work shows that it is wrong to figure magnesia as calculated to its lime equivalent and that the chemical constitution of the slags is of less importance than their temperatures.

In oral discussion of this paper, Dr. Alfred Stansfield, Montreal, called attention to the paper's importance and predicted the methods would be found useful in investigation of the influence of titanium in slags, which was of great interest in Canada because of the titanium content of the Canadian iron ores.

A. L. Feild, Long Island City, N. Y., discussed the paper, pointing out the directions for profitable future attack, to permit a better control of sulphur in the blast furnace.

H. A. Schwartz discussed his own paper briefly. Its discussion in the meeting turned solely on the question of the possibility of having two solid solutions coexistent in the same alloy. A. L. Feild stated that he did not believe it was contrary to the precepts of physical chemistry and Dr. St. John stated that there appeared to be good ground to think that such a condition was possible. Mr. Schwartz said that Dr. Rosenhaim had rejected that possibility.

Zirconium in Steel

A. L. Feild, research metallurgist, Electro Metallurgical Co., New York, presented his paper, "Some Effects of Zirconium in Steel." Extracts from the paper are published elsewhere in this issue. In a written discussion by I. A. Billiar, superintendent open-hearth department, Standard Steel Works, Burnham, Pa., it was stated that zirconium had proved quite successful in the open-hearth department. While no change was noted in physical properties, it seemed to be a more powerful deoxidizer than others they use. They had also used zirconium on crucible steels up to 0.25 per cent sulphur and their results checked Feild's on sulphur fixation.

A written discussion by Dr. H. W. Gillett of the Bureau of Mines, Ithaca, N. Y., expressed his skepticism of the efficacy of zirconium as an addition agent for steel and he cited work of the government bureaus where nickel steels had not been improved by zirconium additions. He did admit the benefit which comes from making high sulphur steels rollable and also the improvement in the zirconium steels due to reduction of the banded structure or ghost lines.

Chrome-Iron Alloys

The paper entitled "Some Commercial Alloys of Iron, Chromium and Carbon in the Higher Chromium Ranges," by C. E. MacQuigg, metallurgist, Research Laboratories, Union Carbide & Carbon Co., Long Island City, N. Y., was presented by the author. The paper discusses the development in some of the properties in alloys of iron chromium and carbon in ranges of chromium much higher than had heretofore been commercialized. Besides their properties of oxidation resistance, these alloys have other valuable properties, such as resistance to acid and mine waters, forgeability, hardness, etc. An abstract of this paper will be published in an early issue of THE IRON AGE.

M. W. Alexander to Report on Europe's Economic Problems

Magnus W. Alexander, managing director of the National Industrial Conference Board, who has been studying industrial and economic conditions throughout the allied nations and Central Europe for the board, arrived in New York on the Resolute, Aug. 31. On his trip he interviewed leaders in industry, finance and in political life and also spoke at meetings of industrialists in England, Germany and Austria. The results of his inquiries will be made known formally at the next meeting of the National Industrial Conference Board on Sept. 20 at the Hotel Astor, New York.

In commenting briefly on the effects of the Ruhr occupation, Mr. Alexander said:

"Superficially the struggle is on between France and Germany. Yet I believe that the real struggle is taking place between France and Great Britain. Politically France is today the dominating power in Europe, and the spirit of Napoleon is again stalking over that Continent. Such dominating supremacy is contrary to the traditional policy of Great Britain, which is naturally seeking to reestablish the conditions of the pre-war period in which its own prestige and power at home and abroad were of the first magnitude.

"Faced at the present time with the gigantic war machine of France and of such allies of France as Poland, Czechoslovakia and Belgium, Great Britain is forced to act with the greatest caution and must bide her time. At present France has gripped the economic heart of Germany in the Ruhr and Rhine sections. She would like to establish herself there permanently, but realizing that she cannot do so, France is already making strong efforts to enter into an economic relationship with Germany.

"The question to us Americans is, where we will stand in the economic life of the civilized world, if on the one hand we are to face a combination of French and German heavy industry, or of English and German on the other?

"Meanwhile Germany is going through a series of financial, social and political convulsions, and these offer a fertile ground for Communism and all the forces of destructive action to rear their heads. Yet I firmly believe that in spite of riots and bloodshed that may continue in Germany for the next few months, communism and its allies will eventually receive a decisive blow, and the directing influence of Moscow, so strongly exerted now through Radek in Berlin, will in time be effectively checked."

Changes in Westinghouse Electric Personnel

A number of changes have been made in the personnel of the district offices of the Westinghouse Electric & Mfg. Co. A. D. Stewart has been appointed branch manager, Butte, Mont., office. L. C. LaMont has been appointed office manager, Los Angeles office, succeeding J. R. Deering, resigned. A. G. Crocker, formerly special power representative, has been appointed manager, industrial division, Detroit office, succeeding E. A. Wooten, who has been assigned to other work. A sub-office of the Baltimore office has been established at Norfolk, Va., with William Ives in charge.

Marting Company Installs Three Shifts

IRONTON, OHIO, Sept. 4.—The 8-hr. day has been established at the blast furnace of the Marting Iron & Steel Co. and reports indicate that the change is working out very well. There have been few complaints from workmen involved. The Marting company is the first merchant interest in the district to put in the three-shift plan, but others are said to be preparing to establish it in the immediate future. At least one of the silvery furnaces in the Jackson-Wellston district has established the short turn, and it is expected that all furnaces operating in the Southern Ohio and Northern Kentucky district will have made effective the shorter hour arrangement before the first of the year.

Japan Offered Aid by American Steel Trade

Preferential Consideration to Be Given for Steel Needs—Many Emergency Inquiries but Real Buying Months Away—Relief Measures the Call of the Hour

NEW YORK, Sept. 4.—In the first few hours of the first business day following the earthquake, tidal wave and fires that have laid waste a number of the cities in central Japan, including Tokio and Yokohama, Japan through Japanese exporting houses in this city was assured of preferential consideration in needs for steel by representatives of producers. Quite generally, the attitude was one of trying to help in a tangible way, though there was a realization that food and other relief measures must come first.

Flood of Emergency Steel Inquiries

At this writing the market has become flooded with inquiries, but few, if any, have emanated from the stricken country. Instead they appear to be forehanded requests for material which it is believed will be needed for emergency construction. Great quantities are not thought likely for a number of months, for it will first be necessary to get order out of chaos, and new construction will doubtless be taken up in a deliberate fashion, as was the case after the fires of San Francisco and Baltimore. That large quantities of steel will be needed goes without saying, largely through measures which will be taken to prohibit construction which does not resist earthquakes. How far structural steel or reinforced concrete will share in new developments cannot be foretold, but the large consumption of sheet steel characterizing Japanese buying for some time, in part the result of fire protection ordinances, will undoubtedly continue on an enlarged scale. In a word, it is expected that a new Tokio will rise freed from old and flimsy structures which had become an increasing menace with the concentration of population.

The scale and scope of the expected emergency buying are forecasted by the inquiries appearing today. One called for 2,000,000 ft. of pipe, others for 100,000 kegs of wire nails. Included were large lots of sheets, several lots of 10,000 boxes of tin plate, round tonnages of both plates and shapes and even several thousand tons of wire rods, the latter apparently for finishing mills in Osaka or elsewhere capable of converting the rods into needed forms of wire and wire products. Owing to the fact that the Japanese houses here had not heard from principals in the devastated zones, little was done beyond reiterating the promise to expedite rolling and shipment when the orders eventuate and, of course, at current prices. No concern was expressed over entering definite orders on the score of ability to pay and numerous were the expressions of regard for the Japanese as respecters of the sanctity of a contract, though admittedly strict in demanding the fulfillment of the letter of a selling agreement.

The American branches of the large Japanese export houses and other interests with export connections in Japan are entirely without instructions as to the present situation and future action to be taken by them. Most of the large Japanese export and import houses have main offices in Tokio with branches in other cities,

THE Area of Destruction, as Far as Is Known, Is Represented by the Shading. To the west it probably included Nagoya. Less than 50 miles away is Osaka, Japan's chief industrial city, which, not being on water navigable for ocean-going vessels, uses Kobe as a port. To the north of the devastated area, or in the eastern section, are the oil and lumber industries as well as some manufacturing plants. In the western section, including Osaka and Kobe, are copper mines, a large number of galvanizing plants, steel works, particularly the great Government works at Moji and the port of Nagasaki. Beyond lies Korea, the seat of further Japanese resources

including Osaka and Kobe, and it has been from the former city that practically all the cables have been received thus far.

While most of the Japanese exporters have taken no action toward suspending shipment of iron and steel under order, it is believed that some method of control over tonnage will be instituted to avoid dangerous congestion of freight at Kobe, which is practically the only available port on the east coast, near to the devastated area and in a large industrial section. Although Osaka is the great industrial city of Japan, its harbor is not navigable for ocean carriers and the weight of all arriving shipments would fall upon Kobe, which, it is believed, will also be the receiving port of much of the food sent into the stricken area from abroad.

Japanese representatives of export companies in Japan point out that the devastated area was not the greatest industrial section of Japan, but, at the same time, contained many small and long established manufacturers, as it was one of the old sections of Japan. There are numerous shipyards and several cotton spinning mills as well as steel works, fertilizer manufacturers, glass factories, electric wire works, india rubber manufacturers, lead pipe makers, tanners, match works, etc., in Tokio. Tokio is the headquarters of 17 Japanese mining companies, 9 railroads, the two largest steamship lines, the Nippon Yusen Kaisha and the Toyo Kisen Kaisha, and many forwarding agents. There are 140 offices of importers and exporters in Tokio alone. In Yokohama and vicinity are a number of shipbuilding, engine and iron works, wire manufacturers, and numerous warehouses. Yokohama had 91 offices of importers and exporters.

With all the destruction of industry that has taken place in this area, it is pointed out that the largest and most important industries of the country are largely in the untouched areas to the north and south. In northeastern Japan are the lumber and oil interests and south of these are some manufactories, including numerous galvanizing plants. In the southwest is the great Imperial Steel Works at Moji, the copper mines and a number of galvanizing plants and steel works. Actually in the devastated area, between Tokio and Yokohama, was the Fuji spinning mills, the largest in the country, and the large naval yards and station at Yokosuka is reported largely destroyed.

So far as exports go, this country stands to face a check for some time, and this is of some importance, seeing that Japan has lately been the chief buyer of the United States. However, it is proper to emphasize that no one in the steel trade voiced anything respecting this fact, all expressions being uniformly a demand for haste in helping Japan by money contributions and otherwise.

Urges Liberal Subscriptions to the Relief Fund

JUDGE ELBERT H. GARY, chairman United States Steel Corporation, was profoundly affected by the news of the great catastrophe in Japan. Since his visit to Japan, a few years ago, Judge Gary has been its ardent friend. He has numerous personal friends in Japan and has many times defended that country when the motives of some of its leaders have been questioned.

In his office Tuesday Judge Gary paid an earnest tribute to the Japanese people and said that he believed that Japan was worthy of special commendation on account of its attitude at the Washington Conference for the Reduction of Armament and for its faithful carrying out of international obligations. "I believe," said Judge Gary, "that now is the time for the people of the United States to express in a very substantial way their friendship for the people of Japan. Our own Steel Corporation has enjoyed for many years a fairly profitable business with Japan. Not only for that reason but also for the sake of humanity it ought to subscribe and I have no doubt will do so as soon as the attention of the finance committee is called to this matter. At the time of the San Francisco disaster we subscribed $115,000. I trust that the subscriptions among the great banks of the country, all kinds of companies and the people in general will be liberal."

On being asked as to Steel Corporation vessels in Japanese waters, Judge Gary said: "We have three ships in Japanese waters, one of which has been badly damaged and is now beached at Yokohama. We have received as yet no communication from our representative in Tokio. So far as I know, we have lost only one man."

By direction of Henry W. Taft, president of the Japanese Society, an organization of about 1500 members in New York, a committee of members has been formed under the chairmanship of Judge Gary to appeal to the members of the society for contributions toward a fund to furnish immediate relief to the Japanese sufferers. Checks are to be sent to Mortimer M. Schiff, 52 Beaver Street, New York, treasurer of the committee.

Japan's Consumption of American Steel

WHILE the first thought in connection with the appalling disaster in Japan must necessarily be of relief to the stricken people, at the same time it is in order to survey the situation with regard to the particular needs which must be met in iron and steel and in copper, zinc and the other nonferrous metals, as well as machinery.

Stocks of iron and steel products, mainly imported and located in Tokio, Yokohama, Kobe and other important centers, were reported at the end of last November to amount to 141,288 tons. In the middle of January these stocks were said to be diminishing rapidly. In particular, the tin plate and thin steel plates had been almost exhausted.

In the calendar year 1921 shipments to Japan included 127,230 gross tons of steel sheets, representing 65.8 per cent of the entire American exports of that commodity, 48,827 tons of structural steel, 42,239 tons of steel rails, 31,077 tons of tin plate, 31,037 tons of steel plates and 29,017 tons of welded pipe.

In connection with these items it was reported in the fall of 1921 that the structural steel being shipped was principally for office buildings in Tokio. These are the ones which were being put up by the George A. Fuller Co., New York, and recently have been completed. It was further given out that the thin steel sheets which were going over the Pacific in such large quantity were being galvanized in Japan for building and other uses. In connection with this galvanizing, 68 per cent of the zinc exported from the United States in the first 10 months of 1921 was consigned to Japan.

During the first few months of 1921 Japan was the largest customer of the United States for iron and steel products, having temporarily displaced Canada from a position of many years' standing. In January Japan led in steel rails, galvanized sheets, black sheets (taking 89.5 per cent of this item exported), tin plate, galvanized wire and wire nails. This large movement was attributed partly to the fact that the Japanese iron and steel industry was greatly depressed owing to its inability to produce as economically as the industries in the United States and other countries, where the operations have long been organized on an efficient basis.

In the calendar year 1922 the exports to Japan

included 133,134 tons of steel rails, 159,089 tons of black sheets, 31,944 tons of galvanized sheets, and 27,756 tons of tin plate.

Imports into Japan reported by the Japanese customs authorities for the first nine months of 1922 included the following items: Copper, 19,497 metric tons; tin, 1995 tons; lead, 30,533 tons; zinc, 32,452 tons.

Steel Frame Buildings in Japan

In an interview published in the *New York Herald*, Sept. 4, James Baird, president George A. Fuller Co., which has built about $15,000,000 worth of buildings in Tokio in the past three years, expressed himself as confident that they had passed through the earthquake with only superficial damage. They "went through a stiff earthquake at Tokio a year ago. The four large buildings which were completed recently were designed by Japanese engineers, and contained steel skeletons of extra weight and strength to resist earthquakes. They are powerfully wind braced and earthquake braced, with extra plates used to join the steel beams to the steel columns. This stiffens the entire skeleton and causes it to move as one piece. Earthquakes do their damage on buildings that yield because part of the building is thrown in one direction and part in another. The buildings in question range up to a maximum of 10 stories, with wooden and concrete piles used for foundation, down through the sand upon which the city of Tokio is built.

"It is probable that the earthquake stripped the exterior of these buildings, the surface being of colored tiles laid on superficially. If the fire has raged throughout the city the interiors may have been burned out. The largest of these buildings, the Marunouchi Building, was the largest office structure in Asia, being eight stories high and covering a plot measuring 300 by 350 ft. It was built of steel frame with reinforced concrete arches and concrete floors and it is 100 ft. high —the highest structure permitted by the Tokio building laws. The cost was about $5,000,000."

An exporter who was in Japan shortly after the earthquake of last year told THE IRON AGE representative that the structural steel buildings in Tokio suffered in that earthquake in so far as their brick or tiled veneer is concerned. The steel skeletons remained intact, but the greater part of the brick walls fell and left the framework exposed. In repairing these buildings stiffening braces were put in, apparently along the lines indicated above, so that the buildings might better resist future earthquake movements. Whether any definite step was taken to put on a covering for the exterior which would be equally immune to earth tremors is not known.

Steel Sheets

In THE IRON AGE of Jan. 26, 1922, page 274, appears a well-illustrated article devoted to the use of American steel sheets in Japan. Their use was furthered by more rigid fire laws which called for the gradual abolition of the flimsy construction materials used in most buildings throughout Japan. All new buildings in Tokio since May, 1919, have had to have non-inflammable roofs, such as tiles or steel sheets. These regulations also required the reconstruction within four years, which have now expired, of old roofs in congested districts and also those in close proximity to railroads. One of the photographs reproduced in that article shows the Marunouchi Building in course of construction. More than 5000 tons of American structural steel were put into it, besides large amounts of galvanized corrugated sheets.

Among the varied uses of galvanized sheets in Japan, that article lists roofing and siding of buildings, particularly moving picture houses, with which Japan is full, fencing, gutters, leaders and drain pipes, copings for walls, lining for wooden pipe, stove pipe, buckets and pails, sign boards, merchandise carts and wagons, sliding doors, shutters and double doors for warehouses and for showcases, paneling of various types, display boards for posters and various kitchen utensils. Locks and door trimmings, shovels, stamped ware, enameled cups, plates, basins and spoons, clothes chests, etc., are made also of black sheets, some of them being enameled or otherwise finished.

JAPAN'S TRADE AT STANDSTILL

Exporters Await Instructions on Shipments—Wire Rod Buying Heavy—Much Cancellation Not Expected

NEW YORK, Sept. 4.—Export to Japan is today at a standstill, with practically all exporters to the Far East awaiting advices from their Japanese offices. As a great majority of the export of iron and steel to Japan is handled through Japanese owned export companies and most of these houses have their main offices in Tokio, action is temporarily paralyzed until instructions have been received. The only information that has thus far arrived has been from branch offices in Osaka. In practically all cases, Japanese exporters are making no effort to suspend shipments until instructed to do so from the home office.

As most of the recent purchasing has been by the Imperial Government or large oil interests and railroads and the merchant buying has been small because of price considerations, it seems to be generally felt that there will be a minimum of cancellation of orders, as practically all the material under order will be needed more keenly than before the present catastrophe. Of the tonnage of structural material recently booked for Japan by a leading independent export interest a part was for the Nishi flour mills, near Tokio, and a fair-sized tonnage for the Hattori Building in Tokio, which it was intended should compare favorably with the great Marunouchi Building, although not on as large a scale. A few smaller projects were included in this tonnage.

Rail Business

Japanese purchasing of rails has been particularly keen. Of a recent inquiry from a privately owned railroad, which totaled 3000 tons of 16-lb., 18-lb., 20-lb., 25-lb. and 30-lb. sections, slightly less than 300 tons of 25-lb. and 30-lb. rails were placed with the Mitsubishi Shoji Kaisha, New York, and 500 tons with Asano Bussan & Co., New York.

An inquiry pending for some time, from a privately owned line in Korea, connecting with the Korean State Railways, has been awarded to the Mitsubishi Shoji Kaisha. It calls for about 24 miles of 60-lb. rails. The 1100 tons of special length 60-lb. and 100-lb. rails, recently asked for by the Imperial Government Railways has been awarded to the New York branch of a Japanese export house and placed with an American mill. Among a number of smaller inquiries for rails from private sources is a request for prices on about 15 miles of 45-lb. sections and an inquiry for between four and five miles of light rails. Whether many of these small inquiries from private sources will materialize into business, in view of the possibly unfortunate situation of these buyers, seems doubtful.

While the purchasing of wire rods for shipment to Japan continued until the earthquake, most of the business was booked with Canadian interests, and the recent increase in quotations by the Canadian sellers evidently effected a slight curtailment of the volume of this business. Exporters point out that Japanese consumption of wire rods has been replacing gradually the heavy buying of wire as more and more plants were established for drawing wire. Most of these plants have been equipped for drawing only the standard gages, and special specifications must still be imported. How much of an effect the earthquake has had in destroying this industry is, of course, not yet known.

Sales to Chinese merchants continue light, with the chief feature of this market a moderate volume of business in wire shorts. South American business continues to appear in small lots, but a large part of this purchasing is undoubtedly being placed with European sellers at lower prices than those quoted by American mills. The South Australian Harbors Board, Adelaide, South Australia, is in the market for four electric coal-unloading cranes of 7 tons capacity. Bids on this tender will be opened Oct. 30 and complete specifications for bidding are in the hands of the Bureau of Foreign and Domestic Commerce, at the New York, Chicago and Philadelphia offices of the bureau.

RAILROADS PROTEST

Object to Proposed Decrease of Rates on Iron and Steel from Chicago to Indianapolis

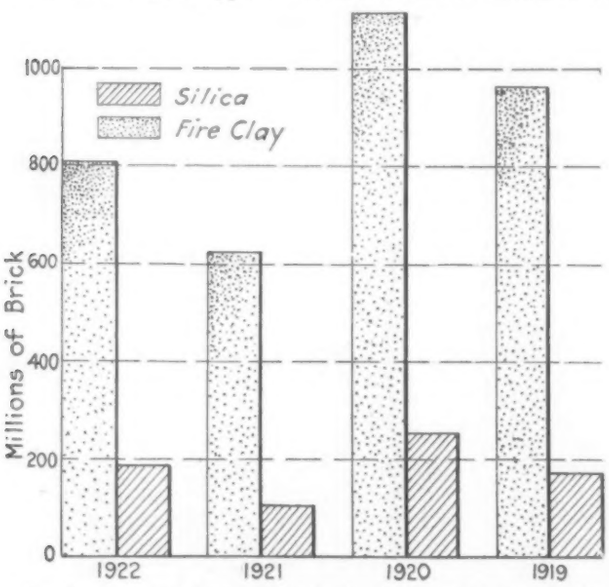
WASHINGTON, Sept. 4.—Railroads serving the iron and steel industries in the Pittsburgh, Ohio and Chicago districts, have filed a protest with the Interstate Commerce Commission against a proposed decrease in the rate on iron and steel articles from Chicago and Gary, Ind., to Indianapolis from 25c. to 15.5c. per 100 lb. The proposed reduction in the rate from Chicago and Gary to Indianapolis was filed to become effective Sept. 15. This tariff was filed by the Chicago, Indianapolis & Louisville, and the Chicago, Indianapolis & Western railroads, the lowered rate to apply over their own lines only. The protesting railroads, including the Baltimore & Ohio; Erie; Pennsylvania; New York Central; Lake Erie & Western; the Chesapeake & Ohio, and the Norfolk & Western, in seeking suspension of the proposed Chicago-Gary-Indianapolis rate, contend that the reduction would result in a general disruption of the iron and steel rate adjustment in Central Freight Association territory and that it would have a disastrous effect on the revenues of the carriers. The lines proposing the reduction acted on the theory that they could not justify the present rate of 25c. from Chicago and Gary to Indianapolis because there is a commodity rate of 15.5c. from Chicago to Terre Haute, Ind., involving a haul of but six miles less than to Indianapolis. It also was pointed out that a 15.5c. rate exists from Chicago to Decatur and Springfield, Ill., 12.5c. to Peoria, Bloomington, and Danville, Ill., and 17.5c. to St. Louis.

It was estimated by W. J. Holliday & Co., Indianapolis, in a protest against the suspension of the proposed Chicago-Gary-Indianapolis rate, that they are at a disadvantage of $3.32 per ton, in competing with other steel and iron distributing points in their territory. This company also maintained that the proposal would reduce the disadvantage to $1.32 per ton and to that extent increased its opportunity to compete with distributors at Chicago, which, it was stated, pay no railroad freight because the price of steel at Chicago is approximately the same as at Pittsburgh. This steel price relationship between Chicago and Pittsburgh has existed for about a year, the Holliday petition said, "although the idea of the steel market is that the Pittsburgh price plus or minus the freight rate, according to the point quoting steel." The petition declared that such a condition meant that the rate between Chicago and Indianapolis represented the approximate difference in cost to the distributors and manufacturers at Indianapolis in comparison with competitors at Chicago. The Pittsburgh-Indianapolis rate is 31c. The petition of the Indianapolis company said that the rate situation involved brought about a condition which makes it impossible to distribute steel to various points in Indiana, eastern Illinois, and western Ohio in competition with Chicago. Local business in Indianapolis was said to be insufficient to take the product of a modern steel plant.

While the protesting carriers stated that the 25c. rate grew out of the decision of the commission in the so-called Disque scale case, the Indianapolis Chamber of Commerce has presented comparisons intended to show that the proposed rate of 15.5c. would not be out of line with rates from Chicago to Moline, Ill., Milwaukee and other points.

Manufacture of Fire Clay and Silica Brick

In reporting upon the manufacture of all brick, terra cotta and similar products during the calendar years 1919, 1920, 1921 and 1922, the Department of Commerce segregates the fire brick, both of the clay and of the silica types. The main items of information



Production of Refractory Brick in the United States During Four Years

are covered in the table. It may be noted, however, that the 1922 figures for clay fire brick include 21,438 M. of high alumina brick valued at $802,479, on an average of $37.43 per M. The figures for the three preceding years do not differentiate between the two types.

In addition to the silica brick listed, the 1922 returns show other non-clay refractories, including 10,569 M. of magnesia or magnesite brick valued at $2,629,393; carborundum, chrome and bauxite brick, produced in the order named, to the amount of $979,845; refractories other than brick amounting to $2,690,949 and 61,454 net tons of refractory cement valued at $262,532. In 1921 the production of the magnesite brick and other items listed as above amounted to $2,533,209, no details being given. For 1919 and 1920 there were no data covering these items.

Clay and Refractory Products Made in the United States

	1922	1921	1920	1919
Total value*	$335,518	$278,492	$388,747	$286,261
Of which				
Brick and tile	229,436	186,589	266,953	197,488
Pottery	91,986	84,149	106,717	77,858
Non-clay refractories	14,096	7,754	15,077	10,915
Fire brick, M.	829,191	621,009	1,114,809	963,439
Value*	$31,214	$24,833	$53,416	$38,016
Value per M.	$37.65	$40.00	$47.91	$39.46
Silica brick, M.	186,547	104,990	250,582	211,420
Value*	$7,533	$5,221	$15,077	$10,915
Value per M.	$40.38	$49.72	$60.17	$51.63
Stove lining*	$1,224	$800	$780	$684
Miscellaneous clay products*†	6,345	4,587	8,981	8,840

*Thousands of dollars.
†Includes gas retorts, wall coping, flue lining, prepared clay, etc.

Mackintosh-Hemphill Co. Personnel

The new official personnel, the Mackintosh-Hemphill Co., Pittsburgh, as a result of recent changes, most of which already have been given individually in THE IRON AGE, is as follows:

F. Ramsey Speer, president; F. E. Fawell, vice-president, in charge of sales and engineering, as heretofore; J. H. Bode, formerly chief engineer, vice-president in charge of operations; D. H. Baum, secretary and assistant treasurer; J. C. McFee, assistant secretary and assistant to the president; E. C. B. Gould, assistant sales manager; William L. Ditges, assistant chief engineer; S. R. Willock, manager miscellaneous equipment sales; C. H. Paul, comptroller; H. A. Lomax, manager roll sales; Samuel McMillan, general superintendent, Pittsburgh plants and F. K. Acker, purchasing agent.

IMPROVEMENT IN FRANCE

Coke Situation Easier—Increased Exports with Lower Franc

PARIS, FRANCE, Aug. 24.—Buyers of raw materials are showing caution in the placing of orders, but exporters find a large improvement in business, on account of the depreciation of French money—which is not quite so acute this week, however. On the part of raw materials producers there is a desire for moderation in the prices, thus to allow the exporting of finished products under favorable conditions.

Coke.—During the first 20 days of August, the SCOF received 78,000 tons of Ruhr coke, or a daily average of 3900 tons, showing marked progress on July. Loading operations were made more rapidly. Consequently, the hope is to do without foreign coke, except for Belgian and Dutch supplies, which are still accessible in price. The quality of the Ruhr coke has also been improved, mechanical loading being no longer used.

At the Rheine-Elbe cokeries, not only has sabotage been avoided, but work and production have not been stopped for one moment, so that for about a week the battery furnishes its average production of 300 tons daily. Some other coke plants, which had stopped work for some time, are now again in good working order through the help of French engineering personnel and will be relighted shortly.

Owing to the increase in the price of German coke, which is now as high as that of imported coke in Germany, and owing also to the rise in the cost price of French coke made of British and Dutch fuels, the SCOF price will be raised to 200 fr. per ton, dating from Sept. 1.

Pig Iron.—Owing to the limited coke supplies, output is but slowly progressing, and consequently is being sold very easily. Delivery dates have been extended and prices firm. For export, there is some business done with Great Britain for chill cast foundry pig iron, and with the United States (1681 metric tons in July), Norway, Italy and Switzerland, for hematite pig iron.

During August, a Muerthe-et-Moselle firm has sold 8000 tons of casting pig iron, No. 3 P. L. (2.75 to 3.50 sil.) for 380 fr. a ton, f.o.b., but this is an exceptional price. The last quotations made were more around 395 to 400 fr. for the same grades, and even 410 fr. for the best quality (3 to 3.5 to 4 per cent sil.). If the No. 3 P. L. remains at 400 fr. for September, this will be considered a minimum price, especially as the price for coke will be increased on Sept. 1.

In hematite pig iron, the prices tend toward 500 fr., as was recently quoted by a southwestern plant for first choice small tonnages. Calais blast furnaces have nothing on hand for the time being. In the East, iron is quoted 465 to 475 fr. and in the Center, 460 fr.

Ferroalloys.—The Comptoir Electrometallurgique has established prices for ferrosilicon as follows, dating from Aug. 17:

Delivered Free

25 per cent	750 fr.
45 per cent	1000 fr.
75 per cent	1700 fr.
90 per cent	2100 fr.

(Showing an increase in that price of 50 fr. a ton).

These are official prices, but according to last sales 50 tons of 45 per cent ferrosilicon have been sold for 910 fr. a ton, f.o.b., Meurthe-et-Moselle; 20 tons of 90 per cent ferrosilicon, for 1900 fr. in the Paris area; 50 tons of 70 to 80 per cent ferromanganese have been sold for 1455 fr., delivered Spanish frontier and customs duties excluded.

Semi-Finished Material.—The marketing of production is well assured up to the middle of September. Prices are generally firmer. The following quotations are made:

Ingots	48 to 49 fr.
Blooms	50 to 53 fr.
Billets	53.5 to 55 fr.

Domestic market for basic steel, per 100 kg. f.o.b. East and Lorraine works.

For open-hearth grade, prices range from 2.50 to 4 fr. higher, per 100 kg.

Rolled Steel Products.—In the domestic market, demand is rather satisfactory, as it is for export. Buyers are showing some reserve and are waiting for the liquidation of stocks seized in the Ruhr. These stocks were seized either as a fee for the non-execution of the French orders, or for the non-payment of taxes. The devastated regions will be given the priority on these products, and the prices scheduled for the different grades of rolled steel products are about the same as those applied on the inland market.

The prices for French products range according to the orders booked in the works, favorable if the orders are numerous and composed mostly of the same sizes. There is an upward tendency on beams; sales are made on the basis of 60 to 62 fr. per 100 kg., f.o.b. Rolled steel products are generally quoted 60 to 64 fr. in Lorraine and in the East regions, but in order that the basis price of 60 fr. be applied, orders must involve an average of 100 tons comprising a limited number of sizes. Delays for delivery are of about 6 to 8 weeks, for ordinary sizes, and 8 to 10 weeks for others.

Sheets.—Sheets are comparatively less active because there is very little business for export. Prices are about the same as the week past. Large plates, 64 to 66 fr.; heavy sheets, 65 to 68 fr.; medium sheets, 75 to 85 fr., according to region and grade; light sheets, 95 to 100 fr. per 100 kg., on trucks. Boiler sheets have been sold at 75 fr. per 100 kilos, f.o.b.

Castings.—Business is very quiet. The State Railways have adjudicated prices of steel castings: 50 kg., 41 kg., and 80 kg. for 178 fr., 181 fr. and 188 fr. per 100 kg. respectively; brake wedges in pig iron for 70 to 74.90 fr. per 100 kilos.

Proposed Reduction of Rate on Steel Products to Texas

WASHINGTON, Sept. 4.—In a tentative report prepared by Examiner John T. Money, recommendation has been made to the Interstate Commerce Commission that the rate of 73c. per 100-lb. on iron and steel plates, galvanized roofing, angles, and rivets, from points of production in Ohio, Kentucky, Indiana, Alabama, Illinois, New York and Missouri, to Dallas, Fort Worth and Harry's, Texas, be reduced.

The examiner said the commission should find the rates assailed were unreasonable to the extent they exceeded, prior to July 1, 1922, 60c. to Dallas and 61.5c. to Fort Worth and Harry's and from and including July 1, 1922, 54c. to Dallas and 55.5c. to Fort Worth and Harry's, from St. Louis and points taking the same rates, and that 54c. to Dallas and 55.5c. to Fort Worth and Harry's will be reasonable rates from St. Louis and points taking the same rates for the future. He said the commission should further find that the rates from other points of origin described were and are unreasonable to the extent they exceeded or may exceed the rates suggested from St. Louis, plus the established differentials. He said reparation should be made to the basis indicated on shipments made within two years prior to the filing of the complaint.

Complaint against the rates was made by the Atlas Metal Works, which has plants at the points of destination to which the examiner recommended that the rates be reduced.

Puddling Rate Unchanged

The puddling rate for September-October will remain unchanged at $13.88 per ton, the rate paid in July-August, as a result of the bimonthly examination of sales sheets last week at Youngstown. The average price of bar iron shipments for the 60 days ending Aug. 31 was disclosed at 2.50c. per lb., the same as two months previously.

The settlement was conducted between the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers. James H. Nutt acted for the employers and M. F. Tighe of Pittsburgh for the employees.

AUGUST IRON OUTPUT

Smallest Daily Rate Since February—Decline from July 7840 Tons Per Day

Thirty-three Furnaces Out or Banked and Five Blown In—Net Loss of 28

The decline in pig iron production which set in during July gathered added momentum in August, according to blast furnace statistics collected largely by telegraph. The net loss in furnaces blown out or banked during the month was 28 as compared with 25 in July. The loss in output per day in August of 7840 gross tons compares with 3892 tons in July, or nearly twice as much.

Production of coke and anthracite pig iron for the 31 days in August amounted to 3,435,313 tons or 110,816 tons per day, as compared with 3,678,334 tons in July, a 31-day month, or 118,656 tons per day. The August decrease from July was 243,021 tons or 7840 tons per day. There were 33 furnaces blown out or banked in August and 5 blown in, a net loss of 28 furnaces.

The total number of furnaces in blast on Sept. 1 was 270 as compared with 298 on Aug. 1. The capacity of the 270 furnaces operating Sept. 1 is estimated at 106,590 tons per day as compared with 114,200 tons per day for the 298 furnaces operating on Aug. 1.

The August ferromanganese output of 22,045 tons, while less than that of July, was larger than in any month in the first half of this year. Only 5586 tons of spiegeleisen was made last month.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from August, 1922, is as follows.

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchant	Total
August, 1922	45,672	12,914	58,586
September	53,856	13,935	67,791
October	66,060	19,032	85,092
November	72,177	22,813	94,990
December	75,179	24,398	99,577
January, 1923	79,991	24,190	104,181
February	80,684	26,251	106,935
March	87,881	25,792	113,673
April	90,145	28,179	118,324
May	96,029	28,735	124,764
June	90,907	31,641	122,548
July	88,798	29,858	118,656
August	86,022	24,794	110,816

The figures for daily average production, beginning with January, 1917, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1917—Gross Tons

Jan.	101,643	77,799	106,525	97,264	77,945	53,063	104,181
Feb.	94,473	82,835	105,006	102,720	69,187	58,214	106,935
Mar.	104,882	103,648	99,685	108,900	51,468	65,675	113,673
Apr.	111,165	109,607	82,607	91,327	39,768	69,070	118,324
May	110,238	111,175	68,002	96,312	39,394	74,409	124,764
June	109,002	110,793	70,495	101,451	35,494	78,701	122,280
July	107,820	110,354	78,340	98,931	27,889	77,592	118,656
Aug.	104,772	109,341	88,496	101,529	30,780	58,586	110,816
Sept.	104,465	113,942	82,932	104,310	32,850	67,791	.....
Oct.	106,550	112,482	60,115	106,212	40,215	85,092	.....
Nov.	106,859	111,802	79,745	97,830	47,183	94,990	.....
Dec.	92,997	110,762	84,944	87,222	53,196	99,577	.....
Year	104,619	105,496	83,789	99,492	45,325	73,645	.....

Among the furnaces blown in during August were the following: No. 4 New Castle furnace of the Carnegie Steel Co. and No. 3 Shenango furnace in the Shenango Valley; No. 4 River furnace in northern Ohio; the Philadelphia furnace of the Sloss-Sheffield Steel & Iron Co. in Alabama, and the Helen furnace in Tennessee.

Among the furnaces blown out or banked in August were the following: Buffalo C furnace, Harriet Y furnace and the Standish furnace in New York; F furnace of the Bethlehem Steel Co., one furnace of the New Jersey Zinc Co. and the Carbon furnace in the Lehigh Valley; B furnace of the Bethlehem Steel Co. at Coatesville and the Brooke furnace in the Schuylkill Valley; No. 4 furnace of the Bethlehem Steel Co. at Steelton in the lower Susquehanna Valley; G furnace of the Bethlehem Steel Co. and the Lebanon Valley furnace of the Lavino Furnace Co. in the Lebanon Valley; one Lucy furnace of the Carnegie Steel Co., one Midland furnace of the Pittsburgh Crucible Steel Co. and the Clinton furnace in the Pittsburgh district; the Sharpsville furnace in the Shenango Valley; E and G furnaces of the Bethlehem Steel Co. at Johnstown, Pa.; the two Ashland stacks in Kentucky; the Top Mill furnace of the Wheeling Steel & Iron Co. in the Wheeling district; No. 3 furnace of the Republic Iron & Steel Co. and the two Hubbard furnaces of the Youngstown Sheet & Tube Co. and the Anna furnace in the Mahoning Valley; one furnace of the Columbus works of the American Rolling Mill Co. and one River furnace in central and northern Ohio; the Belfont and Jisco furnaces in southern Ohio; No. 2 Joliet furnace of the Illinois Steel Co. in Illinois; the second Bay View furnace of the Illinois Steel Co. in Wisconsin; No. 2 City furnace and the second Hattie Ensley furnace of the Sloss-Sheffield Steel & Iron Co., and the Alabama City furnace of the Gulf States Steel Co. in Alabama.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for August and the three months preceding:

Pig Iron Production by Districts, Gross Tons

	Aug. (31 days)	July (31 days)	June (30 days)	May (31 days)
New York	246,347	265,406	253,625	266,658
New Jersey	19,449	18,920	26,033	24,605
Lehigh Valley	69,529	90,231	91,078	93,493
Schuylkill Valley	105,448	116,428	117,779	123,061
Lower Susquehanna and Lebanon Valleys	56,884	74,645	64,374	64,609
Pittsburgh district	713,314	759,159	737,839	789,330
Shenango Valley	117,133	142,419	164,969	169,708
Western Pa	193,611	205,059	201,026	221,369
Maryland, Virginia and Kentucky	81,826	91,443	89,164	107,613
Wheeling district	159,418	155,324	149,067	157,071
Mahoning Valley	338,466	366,681	378,170	383,068
Central and Northern Ohio	287,641	286,021	289,498	309,261
Southern Ohio	46,779	72,120	74,798	77,402
Illinois and Indiana	630,045	643,043	620,281	646,913
Mich., Minn., Mo., Wis. and Colo	121,172	139,330	159,254	160,456
Alabama	230,468	236,049	239,589	249,810
Tennessee	17,783	16,056	19,901	23,267
Total	3,435,313	3,678,334	3,676,445	3,867,694

Capacities in Blast Sept. 1

The following table shows the number of furnaces in blast Sept. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Aug. 1:

Coke and Anthracite Furnaces in Blast

Location of Furnaces	Total Stacks	Sept. 1 — In Blast	Sept. 1 — Capacity per Day	Aug. 1 — In Blast	Aug. 1 — Capacity per Day
New York:					
Buffalo	22	18	7,120	20	7,670
Other New York	5	3	650	4	870
New Jersey	4	2	625	2	610
Pennsylvania:					
Lehigh Valley	16	6	2,060	8	2,340
Spiegeleisen	2	1	140	2	210
Schuylkill Valley	15	10	3,185	12	3,760
Lower Susquehanna	9	5	1,000	6	1,870
Ferromanganese	1	1	60	1	65
Lebanon Valley	6	1	200	2	345
Ferromanganese	2	1	80	2	120
Pittsburgh district	55	49	22,560	52	23,700
Ferro and spiegel.	4	2	335	2	235
Shenango Valley	19	11	4,300	10	3,860
Western Pennsylvania	25	16	6,120	18	6,495
Ferromanganese	1	1	120	1	120
Maryland	5	4	1,285	4	1,400
Ferromanganese	1	1	100	1	110
Wheeling district	15	11	4,840	12	5,010
Ohio:					
Mahoning Valley	28	21	9,930	25	11,650
Central and Northern	26	19	8,500	20	8,925
Southern	16	5	1,400	7	1,760
Illinois and Indiana	42	37	19,800	38	20,090
Mich., Wis. and Minn.	12	9	3,390	10	3,410
Colorado and Missouri	6	1	400	1	350
The South:					
Virginia	18	6	900	6	830
Kentucky	7	0	.....	2	505
Alabama	39	24	6,920	25	7,310
Ferromanganese	1	0	.....	1	80
Tenn., Ga. and Texas	16	5	570	4	500
Total	419	270	106,590	298	114,200

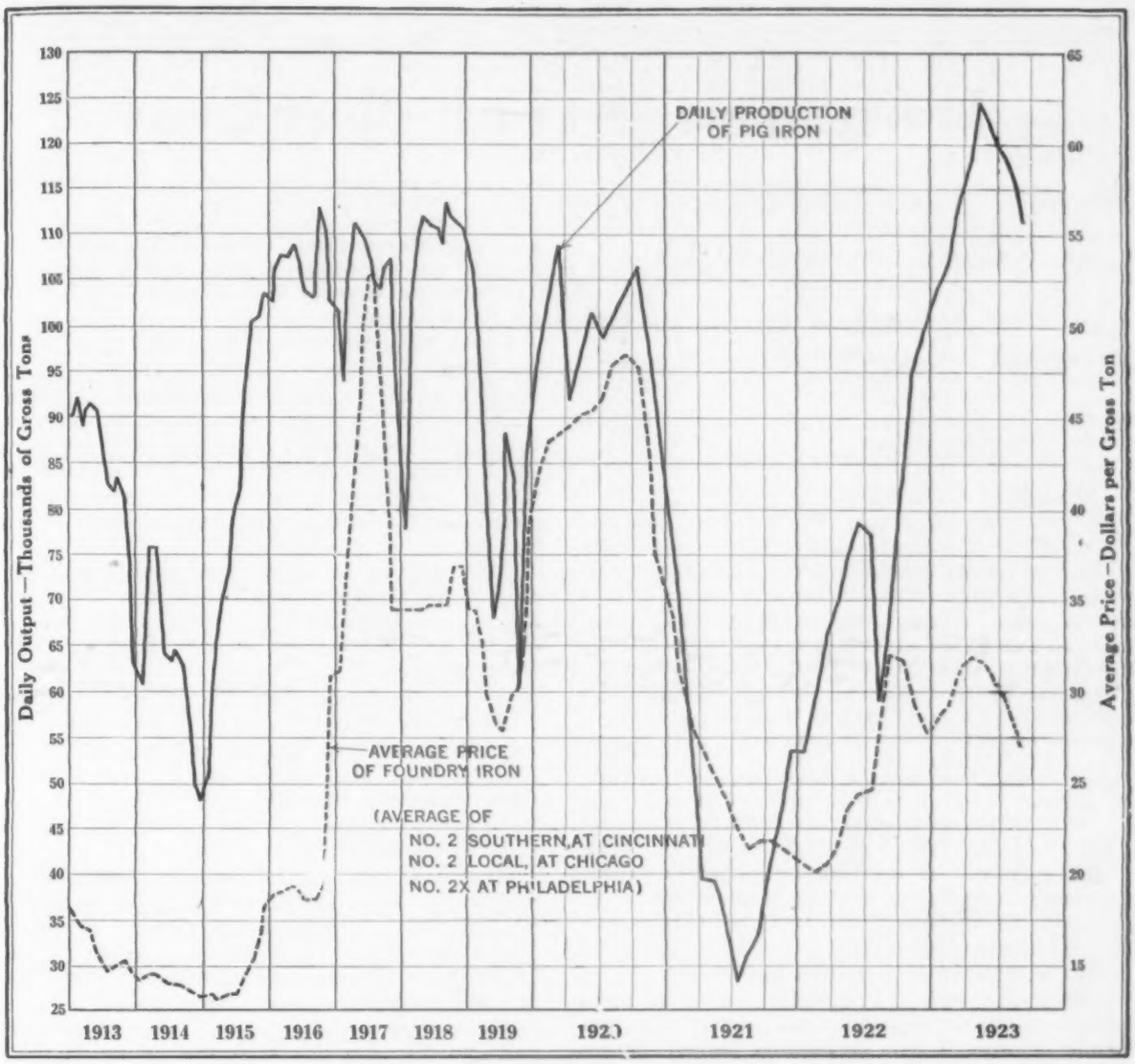


Diagram of Pig Iron Production and Price

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of the daily average production, by months, of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2 foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1919—Gross Tons

	1919	1920	1921	1922	1923
Jan.	3,302,260	3,015,181	2,416,292	1,644,951	3,229,604
Feb.	2,940,168	2,978,879	1,937,257	1,629,991	2,994,187
Mar.	3,090,243	3,375,907	1,595,522	2,035,920	3,523,868
Apr.	2,478,218	2,739,797	1,193,041	2,072,114	3,549,736
May	2,108,056	2,985,682	1,221,221	2,306,679	3,867,694
June	2,114,863	3,043,540	1,064,833	2,361,028	3,676,445
½ year	16,033,808	18,138,986	9,428,166	12,050,683	20,841,534
July	2,428,541	3,067,043	864,555	2,405,365	3,678,334
Aug.	2,743,388	3,147,402	954,193	1,816,170	3,435,313
Sept.	2,487,965	3,129,323	985,529	2,033,720	.....
Oct.	1,863,558	3,292,597	1,246,676	2,637,844	.....
Nov.	2,392,350	2,934,908	1,415,481	2,849,703	.....
Dec.	2,633,268	2,703,855	1,469,086	3,086,898	.....
Year*	30,582,878	36,414,114	16,543,686	26,880,383	.....

*These totals do not include charcoal pig iron. The 1922 production of this iron was 224,731 tons.

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the foregoing totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Total Production		Spiegeleisen and Ferromanganese			
			1922		1923	
	1922	1923	Fe-Mn	Spiegel	Fe-Mn	Spiegel
Jan.	1,306,045	2,479,727	6,874	1,230	19,358	12,656
Feb.	1,311,170	2,259,154	3,610	4,930	21,383	3,657
Mar.	1,629,982	2,724,305	11,600	2,095	20,730	13,832
Apr.	1,707,902	2,704,360	14,998	4,211	20,808	7,440
May	1,879,180	2,976,892	15,432	4,902	19,568	9,533
June	1,876,033	2,727,208	18,273	4,817	19,717	18,289
6 mos.	9,710,312	15,871,646	70,787	22,185	121,564	64,807
July	1,931,138	2,752,738	18,873	7,176	26,493	12,876
Aug.	1,415,832	2,666,671	11,402	7,925	22,045	5,586
Sept.	1,615,696	.....	10,681	4,235	.....	.....
Oct.	2,047,873	.....	9,193	12,283	.....	.....
Nov.	2,165,295	.....	13,232	4,192	.....	.....
Dec.	2,330,545	.....	17,007	10,591	.....	.....
Year	21,216,691	.....	151,175	68,587	.....	.....
8 mos.	.....	21,291,055	.....	.....	170,102	83,269

Reports that the Harbison-Walker Refractories Co., Pittsburgh, is to build a $600,000 works at Bessemer, Ala., are declared by officials of the company to be decidedly premature. While it is admitted that such a project is in contemplation, it is stated that not a move yet has been made in the direction of drawing plans. Repair work now in progress at the Southern properties of the company will be completed before anything is done about the new Bessemer plant. The report probably originated in some real estate purchases recently made by the company in Bessemer.

Iron and Steel Markets

STEEL FOR JAPAN

Considerable Inquiries for Relief Construction—Sheets Will Figure Largely

Pig Iron Output Again Drops Sharply—Lower Steel Prices at Chicago

Relief for Japan has been the first concern of the steel trade, and even as this is written New York offices of the leading producers have before them good-sized inquiries from Japanese exporters representing expected needs in steel for emergency work. These houses were assured that all expedition would be given to the shipment of relief material.

Items in the inquiries already received are 400 miles of pipe, 100,000 kegs of wire nails, several thousand tons of wire rods, a number of 10,000-box lots of tin plates and round tonnages of sheets, plates and structural material.

Large shipments of sheets for temporary fireproof housing are already planned. For many months Japan has been buying American sheets in quantities to comply with new fire protection laws of Tokio, these shipments from this country in the fiscal year ended June 30, 1922, being nearly a quarter of a million tons.

Recalling how deliberately new steel buildings went up in San Francisco in 1906, the steel trade believes it will be months before the real reconstruction demand from Japan will be felt. Time will be required to determine the character of permanent structures. Meanwhile continued shipments of sheets on a large scale are expected. Our London cable reports that Japanese houses there are buying sheets feverishly.

In the domestic market the further cutting down of pig iron output in August has been of chief interest. Production for the month was 3,435,313 tons, or 110,816 tons a day, as against 3,678,334 tons in July, or 118,656 tons a day, a falling off of 6.5 per cent.

August showed a net loss of 28 blast furnaces, on top of the loss of 25 in July. The capacity of the 270 furnaces in blast Sept. 1 was 106,590 tons a day, as compared with 114,200 tons a day for the 298 furnaces in operation as August opened.

It is estimated that steel production in August will show somewhat less falling off than that in pig iron.

In finished steel products reports agree that the past month's shipments were well in excess of new orders, but with buyers following the policy of keeping close to the mills, new September orders are expected to reach fair proportions.

At Chicago the leading independent steel company has announced prices for the fourth quarter at 2.50c. for bars and 2.60c. for structural shapes and plates, as against its third quarter prices of 2.60c. for bars, 2.70c. for shapes and 2.80c. for plates.

Fabricated steel made a good showing for a normally quiet period, upward of 16,000 tons being bought, including 3700 tons for the first section of the Ford steel plant near Detroit.

While some sheet mills report a better demand, others are in need of orders. Black sheets can still be had at 3.75c., Pittsburgh, and on all sheets warehouse prices show irregularity.

The American Sheet & Tin Plate Co. opens its books for fourth quarter tin plates this week at the present price of $5.50 per box. Owing to the large orders carried over, the company has for sale one month's production in the fourth quarter. In sheets it can offer two months' production.

Rail buying is still the feature at Chicago, mills there having booked 80,000 tons for 1924 in the past week. The Chesapeake & Ohio is inquiring for 30,000 tons and the Hocking Valley for 5400 tons.

In the Pittsburgh district a contract for 30,000 to 40,000 tons of billets and slabs has been closed for September and fourth quarter delivery at $42.50. Cleveland reports sales of 12,000 tons of sheet bars at the same price. However, a billet sale at Pittsburgh was at $40 and a Cleveland consumer was able to buy at $42, delivered.

Increased firmness in the pig iron market in the East is attributed to the strike of anthracite miners, which is responsible for the advancing quotations on coke, and prices of some foundry grades have been marked up 50c., but Pittsburgh has had a decline of 50c. Birmingham furnaces, which had been holding at $27, have at last gone down to $24, but $23.50 is the ruling figure in the South, where a reduction of active soil pipe capacity has caused decreased demand in pig iron. It is expected that stocks there will show an increase of 30,000 to 40,000 tons in the past month. From Buffalo 3000 tons of foundry iron has been shipped by lake to Milwaukee and two like shipments will follow. Prices of foreign ores are declining.

Railroad rates and wages in Germany went on a gold mark basis in August, causing steel prices to rise rapidly, often beyond world market levels, orders stopping in consequence.

Pittsburgh

August a Heavy Month in Production and Shipment of Steel

PITTSBURGH, Sept. 4.—High lights for the week locally include the formal opening of its book for fourth quarter tonnages by the American Sheet & Tin Plate Co. at unchanged prices; the first contract of any considerable size of billets and slabs for delivery in the last quarter of the year and this at a basis of $42.50, Pittsburgh; the appearance of fresh weakness in foundry iron on moderate sales, the discovery upon complete compilation of the record that locally last month was a pretty heavy one in both production and shipment of steel and that the first effect of the strike of the anthracite coal miners upon the fuel situation here has been much milder than had been expected.

The books of the American Sheet & Tin Plate Co.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 4, 1923	Aug. 28, 1923	Aug. 7, 1923	Sept. 5, 1922
No. 2X, Philadelphia‡	**$26.76**	$26.26	$25.76	$36.14
No. 2, Valley furnace†	*24.50*	25.00	24.00	35.00
No. 2, Southern, Cin'ti†	27.55	27.55	28.05	29.05
No. 2, Birmingham, Ala.†	*23.50*	24.00	24.00	25.00
No. 2 foundry, Chicago*	27.00	27.00	27.00	32.00
Basic, del'd, eastern Pa.	25.00	25.00	25.00	32.00
Basic, Valley furnace	25.00	25.00	24.50	30.00
Valley Bessemer, del. P'gh.	28.26	28.26	28.26	34.77
Malleable, Chicago*	27.00	27.00	27.00	32.00
Malleable, Valley	24.50	24.50	24.50	33.00
Gray forge, Pittsburgh	25.76	25.76	25.76	34.76
L. S. charcoal, Chicago	32.15	32.15	22.15	36.15
Ferromanganese, furnace	*112.50*	117.50	117.50	67.50

Rails, Billets, Etc., Per Gross Ton:				
O.-h. rails heavy, at mill	$43.00	$43.00	$43.00	$40.00
Bess. billets, Pittsburgh	42.50	42.50	42.50	38.00
O.-h. billets, Pittsburgh	42.50	42.50	42.50	38.00
O.-h. sheet bars, P'gh.	42.50	42.50	42.50	40.00
Forging billets, base, P'gh.	47.50	47.50	47.50	43.00
O.-h. billets, Phila.	47.67	47.67	47.67	45.17
Wire rods, Pittsburgh	51.00	51.00	51.00	45.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.40	2.40	2.40	2.00
Light rails at mill	*2.15*	2.25	2.25	2.00

Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.67	2.67	2.67	2.42
Iron bars, Chicago	2.40	2.40	2.50	2.25
Steel bars, Pittsburgh	2.40	2.40	2.40	2.00
Steel bars, Chicago	*2.50*	2.60	2.60	2.10
Steel bars, New York	2.74	2.74	2.74	2.34
Tank plates, Pittsburgh	2.50	2.50	2.50	2.00
Tank plates, Chicago	*2.60*	2.80	2.80	2.30
Tank plates, New York	2.84	2.84	2.84	2.34
Beams, Pittsburgh	2.50	2.50	2.50	2.00
Beams, Chicago	*2.60*	2.70	2.70	2.20
Beams, New York	2.84	2.84	2.84	2.34
Steel hoops, Pittsburgh	3.15	3.15	3.15	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	Sept. 4, 1923	Aug. 28, 1923	Aug. 7, 1923	Sept. 5, 1922
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	3.75	3.75	3.75	3.35
Sheets, galv., No. 28, P'gh.	5.00	5.00	5.00	4.35
Sheets, blue an'l'd, 9 & 10	3.00	3.00	3.00	2.50
Wire nails, Pittsburgh	3.00	3.00	3.00	2.60
Plain wire, Pittsburgh	2.75	2.75	2.75	2.35
Barbed wire, galv., P'gh.	2.80	2.80	3.80	3.15
Tin plate, 100-lb. box, P'gh.	$5.50	$5.50	$5.50	$4.75

Old Material, Per Gross Ton:				
Carwheels, Chicago	**$20.00**	$19.50	$19.50	$22.50
Carwheels, Philadelphia	21.00	21.00	20.00	20.00
Heavy steel scrap, P'gh.	18.00	18.00	17.00	18.50
Heavy steel scrap, Phila.	**17.00**	16.50	15.50	15.50
Heavy steel scrap, Ch'go.	**16.50**	16.00	16.00	17.50
No. 1 cast, Pittsburgh	**22.00**	21.50	20.00	19.00
No. 1 cast, Philadelphia	21.50	21.50	20.00	19.00
No. 1 cast, Ch'go (net ton)	**19.50**	18.50	18.50	21.50
No. 1 RR. wrot. Phila.	18.00	18.00	18.00	18.50
No. 1 RR.wrot.Ch'go (net)	**16.00**	15.00	14.00	17.50

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	**$5.00**	$4.75	$4.50	$10.00
Foundry coke, prompt	**6.00**	5.50	5.25	12.00

Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*14.00*	14.25	14.75	14.12½
Electrolytic copper, refinery	*13.50*	13.75	14.12½	13.75
Zinc, St. Louis	**6.50**	6.42½	6.15	6.25
Zinc, New York	**6.85**	6.77½	6.50	6.60
Lead, St. Louis	**6.70**	6.65	6.62½	5.55
Lead, New York	**7.00**	6.75	6.75	5.90
Tin (Straits), New York	**41.50**	40.75	38.37½	32.50
Antimony (Asiatic), N. Y.	7.50	7.50	7.60	5.37½

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price Sept. 4, 1923, Finished Steel, 2.775c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets

These products constitute 88 per cent of the United States output of finished steel

Aug. 28, 1923,	2.775c.
Aug. 7, 1923,	2.775c.
Sept. 5, 1922,	2.412c.
10-year pre-war average,	1.689c.

Composite Price Sept. 4, 1923, Pig Iron, $25.38 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Aug. 28, 1923,	$25.38
Aug. 7, 1923,	25.04
Sept. 5, 1922,	30.52
10-year pre-war average,	15.72

are to be opened Sept. 6 for such tonnage as this company can take for shipment in the final quarter of the year. The company does not expect now to have more than one month's production of tin plate available and the opening of its books again is merely a formality for an allocation of its output.

All companies shipped steel freely last month, and with the Jones & Laughlin Steel Corporation a new high record in this respect was established with a total outward movement of more than 180,000 tons, equal to about 90 per cent of its theoretic capacity. Since in very few lines new orders have been even approximately as great as completed ones, the effect of the heavy deliveries of the month must have been to not only provide consumers with generous supplies, but also to have materially cut down mill order books.

Business of the week in pig iron has disclosed afresh that the market still is largely in buyers' control. Business pending a week ago and since closed, has in most instances been at below full quotations, as named by Valley furnace interests. There is too much iron available for buyers to be at all nervous about supplies for the remainder of the year. One merchant furnace has been banked since a week ago and three others will go down in the next week or ten days, so unfavorable does the situation appear from either the supply, demand or profits viewpoint. The suspension of these furnaces naturally throws back upon the market the coke contracted for this month's shipment, but its effect upon prices has been slight, because there was an outlet for part of the released supply and there was sufficient warning for the producers to adjust operating schedules. The strike of the hard coal miners has not yet had much effect upon the fuel market here, other than to stimulate some buying of foundry coke for reserves. The strike may yet be settled before there is any considerable loss of production or before present stocks are down to the danger point. Buyers are not beginning to be panicky over the situation and there is a commendable disposition on the part of coke and coal producers to keep the market out of the hands of the speculators.

Much has been said lately about the improved sentiment in steel trade circles, but evidently the improvement is sentimental and nothing more. Certainly, few companies can boast of as large order books as they had a month ago, and so long as shipping conditions are as free as they are now, there is every reason to suppose that buyers will continue to buy close to their immediate requirements. Suggestions of higher prices as

a result of the change of working hours in continuous process departments are fainter, and it now is quite apparent that no change from present prices is immediately ahead. Railroads not only are functioning fully, but are reporting surplus car supplies.

Pig Iron.—A week ago it was noted in this report that Westinghouse Electric Mfg. Co. was in the market for 1200 tons of foundry iron for September shipment, the National Transit, Pump & Machinery Co. for a like tonnage for delivery this month, and the Monongahela Iron & Steel Co. for 1000 tons of Bessemer iron. All of this business has since been closed and only on a very small part of the total tonnage was the recent Valley furnace price obtained, this being on some of the Westinghouse purchase, on which $25 was paid. The sales of foundry iron taken as a whole were generally at $24.50 to $25 and we revise our prices accordingly, although one merchant producer in the week advanced his base price from $25 to $26 on foundry iron. The Bessemer iron was sold by the Wheeling Steel Corporation at the Valley price of this grade f.o.b. furnace in conjunction with a sale of coke by interests controlling the purchasing company at a lower price than the Wheeling company had been able to secure elsewhere. The Verona Steel Casting Co. has bought 500 tons of basic and a quotation of $35 Valley furnace was not interesting to it. The Brackenridge steel interest reported a week ago as seeking 5000 tons of basic iron has not yet closed and expects to be able to secure the tonnage at less than $25 Valley furnace. A Cleveland furnace interest has taken 1500 tons of malleable for the Link Belt Co., Indianapolis, at slightly under $24.50, furnace. This grade also is quotable at the same figure at Valley furnace, although some producers continue to quote up to $26. Dover furnace of the M. A. Hanna Co., Canal Dover, Ohio, will go out of blast late this week and the Claire furnace, Sharpsville, Pa., is scheduled to go down Sept. 12. the furnace of the McKeefrey Iron Co., Leetonia, Ohio, also will stop making iron soon and the stack of the Struthers Furnace Co. already has been banked. No. 3 Shenango furnace, Sharpsville, Pa., again is making iron after being banked for a month and No. 4 Newcastle furnace, Carnegie Steel Co. blew in a week ago.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.76 per gross ton:

Basic	$25.00
Bessemer	26.50
Gray forge	$24.00 to 24.50
No. 2 foundry	24.50 to 25.00
No. 3 foundry	24.00 to 24.50
Malleable	24.50 to 25.50
Low phosphorus, copper free	31.00 to 32.00

Ferroalloys.—Sales of ferromanganese, aggregating 1500 tons, have been made in the past few days to consumers west of this district at $112.50, seaboard. About 1000 tons was British material and the remainder domestic. The business at least partly establishes the market at that level, but there is some doubt that even this price can be maintained, as resale British alloy still is offered at $111.50. Local consumers are well covered against their requirements for most of the remainder of the year and since the average price was not over $110, they are not disposed to enter the market at the new level. Small lots of spiegeleisen now are to be had at $45, furnace, for 20 per cent, leaving open the inference that less would be done on sizable tonnages. Prices are given on page 643.

Semi-Finished Steel.—A contract has just been closed involving between 30,000 and 40,000 tons of billets and slabs for September and last quarter delivery to a local finishing mill at $42.50, Pittsburgh. This is the first fourth quarter business that has been reported and constitutes the largest bit of business done in several weeks. Embracing tonnage for September shipment, it establishes the market locally at $42.50, but as $40, Pittsburgh, has been done on billets recently, the quotable market on billets is from $40 to $42.50. Mills in this territory are holding very firmly to the latter figure on sheet bars, but not much business is up at present and buyers are not specifying very fully on their third quarter engagements. Skelp is inactive and rods are slow in keeping with conditions in the finished products. Prices are given on page 642.

Wire Products.—Books of most makers now are open on fourth quarter business, but it cannot be said that buyers are yet very eager to place orders for that period. While there is nothing to indicate lower prices in the near future, signs of an advance likewise are lacking and the buyer therefore feels there is nothing to lose by taking his time. New business was better in August than in July, but the gain was not sufficient to prevent mills from making inroads on their backlog business and there are few products on which delivery cannot now be made promptly. Prices are given on page 642.

Steel Rails.—Local makers of light rails continue to quote 2.25c., base, 25 to 45-lb. sections, and claim sales at that price, but competition from rerolled rails is beginning to tell, as on some attractive orders, 2.15c., base, has been done. Rerolled rails still are priced at 1.90c. to 2c., base, 12 to 45-lb. sections. A better market is looked for in the near future, as the strike of the hard coal miners is expected to bring about an increased demand for soft coal, which will mean the starting up of a good many bituminous operations, which have been idle because of low prices and unprofitable operation.

We quote light rails rolled from new steel at 2.15c. to 2.25c. base (25-lb. to 45-lb.); those rolled from old rails, 1.90c. to 2c. base (12-lb. to 45-lb.), f.o.b. mill; standard rails, $43 per gross ton mill, for Bessemer and open-hearth sections.

Hot-Rolled Flats.—The market shows more resistance to efforts to secure tonnages at less than the quoted prices than was the case recently. This is due to the fact that a comfortable amount of business recently has been booked and makers can afford to take a more independent position. The weakest spot still is in the wider sizes of strips and in rim stock, in which bookings have not gained as much as in the other sizes. It is reported that a Western maker of rim stock has been going as low as 2.90c., base, for desirable orders, as against 3c., the regular base on this material. Hot-rolled strips for cold-rolling also are priced at 3c., base, and wide strips go that low in competition with blue annealed sheets or skelp. Otherwise, 3.15c., base, is the quotation. Prices are given on page 642.

Iron and Steel Bars.—Specifications on old steel bar orders are free, but this may be partly due to the fact that the application of the new extras adopted by leading makers as of July 1 does not affect old tonnages. Oct. 1 is the date the new extras become effective with some makers. Reports of shading of the base price of 2.40c. are not well founded. Prices of iron bars also are holding, though demands are dwindling.

We quote soft steel bars, rolled from billets, at 2.40c. base; bars for cold-finishing of screw stock analysis, $3 per ton over base; reinforcing bars, rolled from billets, 2.40c. base; refined iron bars, 3.25c. base, in carload lots or more f.o.b. Pittsburgh.

Structural Material.—The Carnegie Steel Co. will furnish the steel, slightly under 4000 tons, for the first unit of the steel plant of the Ford Motor Co., River Rouge, Detroit, recently awarded the McClintic-Marshall Co. No other big tonnages are noted in recent bookings, although much tonnage is involved in the protection sought by fabricators bidding on pending structural projects. There are no intimations that less than 2.50c. is being done on plain material. Prices are given on page 642.

Tin Plate.—Prices on such tonnage of tin plate as the American Sheet & Tin Plate Co. can take for last quarter shipment, about six weeks' production, will be $5.50 per base box, Pittsburgh. Books will be formally opened on Sept. 6. Independent companies will probably adopt this price. All makers are well behind their orders, most of them at least a month.

Cold-Finished Steel Bars and Shafting.—With the automotive industry operating more smoothly on the 1924 models, there has been some increase in the orders and specifications for these bars. Other consuming industries are still buying sparingly and jobbers are not laying in stocks as far ahead as usual owing to the excellent delivery service now provided the mills by the railroads. The price holds at 3.25c. base, Pittsburgh, and on ground shafting at 3.65c. base, f.o.b. mill, for carload lots.

Bolts, Nuts and Rivets.—It is still a good deal of a buyers' market in these products, as makers still need orders. As low as 62 per cent off list recently was quoted on large machine bolts on an attractive railroad inquiry and quoted discounts often increased as much as 5 per cent. Only small lots of rivets are selling above $3 base per 100 lb. for structural rivets and even that price is being shaded on attractive business. Prices and discounts are given on page 642.

Plates.—The market is holding well as to price, but sales are generally of small lots for early delivery, and there are many mills which can accommodate such a demand. Prices are given on page 642.

Tubular Goods.—Pressure for shipments of old orders shows no let up, but new business still lags behind shipments with most makers. The best market is in the butt welded sizes of merchant pipe. One maker reports specifications and new orders for the month of August to have exceeded shipments by 400 tons. On lap-welded pipe, shipments will exceed the new orders, but it is observed that of the shipments a large percentage are direct to consumers, indicating little or no adding to distributors' stocks. Line pipe business still is moderate though the Ashtabula Gas Co. recently distributed orders with three independent mills for 28 miles of 10¾, 31.20-lb. pipe. The story of wrought iron pipe is much the same as that in steel pipe. Boiler tubes are being specified well, but bought rather sparingly. Discounts are given on page 642.

Sheets.—The American Sheet & Tin Plate Co. will open its books for such fourth quarter sheet business as it can take, estimated at about two months' production on Thursday, Sept. 6, at the present prices of 3.85c., base, for black, 5c., base for galvanized; 3c., base for blue annealed and 5.35c., base (No. 28 gage), for automobile body stock. The announcement confirms earlier impressions. It is probable that independent companies following a policy of selling by quarterly periods will name the same prices, but it remains to be seen whether all mills will observe these prices, since there are several which need orders, particularly of black sheets. Orders generally are somewhat heavier than they were recently, but they still are running behind shipments on old purchases. The Japanese disaster has been followed by a heavy call for sheets for temporary housing facilities. Prices are given on page 642.

Track Fastenings.—Prices show no change and demands are along recent lines, being fairly good in large spikes, but still slow on small spikes. Prices are given on page 642.

Coke and Coal.—It is no longer safe for buyers to figure on buying standard furnace coke at less than $5 per net ton at ovens, for while less recently has been done, there is such even balance between supply and demand that offerings now are pretty scant and promise to be more so with more capacity likely to be devoted to the production of heating coke in the event that the strike of the hard coal miners is not speedily settled. More blast furnaces are going out than are going into blast, and this means a limited demand. Nothing yet has developed in connection with fourth quarter contracts, because the pig iron market still is unprofitable for most merchant furnaces. Foundry coke has advanced 50c. a ton under demands for reserve supplies. The minimum now is $6 per net ton at ovens, with as high as $7.50 quoted on some brands. Coal prices reflect the slowing down in industrial demand rather than the possibility of demands as a substitute for hard coal. Mine run steam coal is priced at $2.20 to $2.30 per net ton at mines for Panhandle coal and $1.85 to $2 for Fairmont grade, coking coal $2.25 to $2.35 and gas coal $2.50 flat. Screened coal demands $2.50 to $2.75 for ¾-in. and $3 to $3.50 for 1¼-in.

Old Material.—Strength locally seems to be largely a surface condition and is based more upon the activity of dealers, who having become alarmed that offerings are lighter than they were recently, are showing some anxiety to cover short sales before their profits are wiped out. There has been some opening of consuming points, which recently were closed by embargoes or congestions, but no real revival of consumer buying. Melters generally are disposed to pursue a hand-to-mouth buying policy and efforts of sellers to secure more money have not been successful. A Youngstown steel maker recently bought about 6000 tons of heavy melting and compressed sheet scrap, paying $18.50 for the former and $17 for the latter grade. Mills here and nearby still are out of the market. Steel foundries are evincing some interest in supplies and the grades they take are really firm. An advance in pig iron would help scrap values, but stocks are so heavy that an advance is hardly likely until they have been reduced, either through a larger demand or a curtailment of production. Bundled sheet sides and ends are hard to sell at above $15 and the market here is out of line with primary points on turnings and borings. On the basis of recent sales in Detroit, heavy melting steel should be fetching $19 to $19.50, Pittsburgh, borings $17 to $17.25 and turnings $15 to $16. Railroad lists are running somewhat lighter, but contain some very desirable bridge material.

We quote for delivery to consumers' mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel	$18.00 to $18.50
No. 1 cast, cupola size	22.00 to 22.50
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	19.00 to 20.00
Compressed sheet steel	16.50 to 17.00
Bundles, sheets, sides and ends	15.00 to 15.50
Railroad knuckles and couplers	22.50 to 23.00
Railroad coil and leaf springs	22.50 to 23.00
Low phosphorus bloom and billet ends	24.50 to 25.00
Low phosphorus plate and other material	23.50 to 24.00
Railroad malleable	19.00 to 19.50
Steel car axles	21.50 to 22.00
Cast iron wheels	19.00 to 19.50
Rolled steel wheels	22.50 to 23.00
Machine shop turnings	12.50 to 13.00
Sheet bar crops	21.00 to 21.50
Heavy steel axle turnings	15.50 to 16.00
Short shoveling turnings	15.00 to 15.50
Heavy breakable cast	19.00 to 19.50
Stove plate	15.50 to 16.00
Cast iron borings	15.50 to 16.00
No. 1 railroad wrought	14.50 to 15.00
No. 2 railroad wrought	18.00 to 18.50

No Change in Steel Prices Expected in Youngstown District for Fourth Quarter

YOUNGSTOWN, Sept. 4.—Mahoning Valley steel makers look for continuance of current steel prices in the fourth quarter. Formal price announcements are expected shortly.

President J. A. Campbell of the Youngstown Sheet & Tube Co. voices belief that prevailing levels will be continued. "The volume of business is much improved," he states. "I look for September and October to develop good buying." He points out that the steel industry learned in 1921 the futility of cutting prices to stimulate demand.

Chicago

Rail Buying Continues—Pig Iron Shipped by Water From Buffalo

CHICAGO, Sept. 4.—The foremost local independent which has been taking business for some months at 2.60c., Chicago, for soft steel bars, 2.70c. for structural shapes and 2.80c. for plates, has opened its books for fourth quarter at 2.50c. for bars and 2.60c. for plates and shapes, thereby putting its prices on a parity with those of other local producers. This change in the price situation indicates that all local mills are now able to make satisfactory deliveries and that those producers which have followed a policy of booking ahead for but limited periods are no longer able to sell at higher figures for prompter service rendered.

Rail buying continues to be the feature of the market, a total of about 80,000 tons having been placed with local mills during the week. Inquiries for 30,000 tons have been received from the Chesapeake & Ohio and 5400 tons from the Hocking Valley and it is probable that a substantial part of this tonnage will be bought here.

Other forms of finished steel are in better demand, although a broad buying movement has not yet developed. An active fall in building may be forecast by the week's lettings of reinforcing bars. Awards over 100 tons each numbered 12 and involved a total of 3235 tons. For the new sewage disposal plant of the Chicago Sanitary District 2800 tons of cast-iron pipe and 750 tons of structural steel have been bought in addition to the 6250 tons of reinforcing bars placed a week ago. Steel works and blast furnace operations in this district are unchanged.

Ferroalloys.—Several carlots of spiegeleisen have been sold at $45, Eastern furnace, or $50.80, delivered, Chicago. A number of sales of ferromanganese have been made at $115 Eastern seaboard and, acording to an unconfirmed report, as low as $112.50, Eastern seaboard, was done on a resale lot of material.

We quote 80 per cent ferromanganese, $123.38 delivered from producers; $122.56 delivered resale; 50 per cent ferrosilicon, $88 to $90, delivered; spiegeleisen, 18 to 22 per cent, $50.80, delivered.

Plates.—The Inland Steel Co. has opened its books for fourth quarter at 2.60c., Chicago, a reduction of $4 a ton from its previous price. Its present quotation is the same as that which the leading local interest has been quoting for some time. The Canadian National Railways have ordered 1000 box cars from the Western Steel Car & Foundry Co. The plates, shapes and bars, amounting to about 12,000 tons, will be furnished by the Illinois Steel Co. No new oil storage tank business is reported. Shipments from local mills continue to exceed bookings, but inquiries for plates are more numerous than during the past two months.

The mill quotation is 2.60c., Chicago. Jobbers quote 3.30c. for plates out of stock.

Pig Iron.—The steamship Griffin docked in the Menomonie River, Milwaukee, Saturday, Sept. 1, with a cargo of about 3000 tons of Susquehanna iron from Buffalo. The iron, which is of No. 1 foundry grade ranging from 2.25 to 2.75 per cent silicon content, will be marketed in the Chicago district by Rogers, Brown & Co. Two additional shipments of about the same size will probably be made. This is the third time the Great Lakes have been used for long pig iron hauls within a year. In 1922, 12,000 tons of merchant iron was shipped by boat from Buffalo to Chicago and 10,000 tons from Duluth to Buffalo. Water transportation again promises to be a factor in the shipment of pig iron from the South, Southern foundry for rail and water shipment being quoted at $28.65, delivered, Chicago. The price of Southern iron for all-rail shipments is unchanged, although three leading producers which had held to a nominal quotation of $27, base, Birmingham, are now quoting $24. Sales of Southern foundry are confined to carload lots and will probably not become much of a factor until delivered prices in this district are more nearly competitive with those from Northern furnaces. Local iron remains steady at $27, base, furnace, with orders coming in at an encouraging rate. Although caution on the part of buyers has not disappeared, more melters are placing their requirements for the remainder of the year and some interest is being shown in first quarter needs. There is no doubt that the coal strike, with its possible effects on blast furnace production costs, is causing buyers to become concerned about their supplies. An Illinois melter is inquiring for 3000 tons of foundry for fourth quarter and another user in the Western part of the State is in the market for 1000 tons for first quarter. A Wisconsin plant wants 500 tons of malleable for fourth quarter delivery. A Milwaukee melter has closed for 1000 tons of foundry and malleable for shipment over the rest of the year.

Quotations on Northern foundry high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumer,s yard or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	$32.04 to $32.15
Northern coke, No. 1, sil. 2.25 to 2.75	27.50
Northern coke, foundry No. 2, sil. 1.75 to 2.25	27.00
Malleable, not over 2.25 sil.	27.00
Basic	27.00
High phosphorus	27.00
Southern No. 2	28.65 to 30.01
Low phos., sil. 1 to 2 per cent, copper free	34.00 to 35.00
Silvery, sil. 8 per cent	39.29

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. has been awarded 2800 tons for the north side sewage disposal plant of the Sanitary District, Chicago. Saginaw, Mich., takes bids on 120 tons of 6-in. Sept. 4.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $64.20; 6-in. to 12-in., $60.20; above 12-in., $57.20 to $59.20; class A and gas pipe, $5 extra.

Sheets.—Inquiries are more numerous and prices are steadier than for some weeks. It cannot be said, however, that a real buying movement is under way. Neither of the local producers has yet opened its books for fourth quarter, although they continue to take current business at unchanged prices. Some mills are not particularly anxious to take heavy forward commitments at this time in view of the uncertainty of costs. A coal strike might increase costs materially and the elimination of the 12-hr. day by producers of semi-finished material carries with it the possibility of an advance in sheet bars.

Mill quotations are 3.85c. for No. 28 black, 3c. for No. 10 blue annealed and 5c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote, f.o.b. Chicago, 4.35c. for blue annealed, 5.20c. for black and 6.35c. for galvanized.

Structural Material.—Demand for plain material still falls short of current shipments from the mills, but building activity in this section is keeping up surprisingly well for this season. Structural awards are fewer than a week ago, but considerable tonnage is pending. The foremost independent has opened its books for fourth quarter at 2.60c., Chicago, a reduction of $2 a ton from its prior quotation. The prices of all local mills are now on the same basis.

The mill quotation on plain material is 2.60c., Chicago. Jobbers quote 3.30c. for plain material out of warehouse.

Bars.—Inquiries for soft steel bars are more numerous, but in most cases they involve comparatively small tonnages. In some quarters this is interpreted as an indication of continued caution on the part of buyers, but in the case of manufacturing consumers it may be due to the fact that orders for their fabricated products are slow in coming in. Industrial operations, however, show little recession. Local prices on soft steel bars are now on a single level, the price of the Inland Steel Co. having been reduced $2 a ton to 2.50c., Chicago, for fourth quarter delivery. Mills east of here continue to sell soft steel bars and angles in lots of 50 to 100 tons when they can make quicker shipment than local mills. This business is moving at 2.40c., Pittsburgh.

A new national classification of extras on iron bars and bands was put into effect Sept. 1. This is the first time bar iron extras have been changed since Dec. 3,

1895. One of the most important features of the classification is that the extras are net to the customer as shown on the card instead of one-half of the published figures as formerly. The new extras on ovals, half-ovals, half-rounds, hexagons and bands are the same as those adopted for soft steel on July 1. On rounds and squares the extras are the same as those for soft steel for sizes from 3-16 in. up to 11-16 in., but differ on the larger sizes. The extras for flats also differ from those on soft steel. Quantity differentials and extras for cutting to length are identical with those on steel. For machine straightening an extra of 10c. per 100 lb. has been named.

Demand for bar iron shows no material change. Some mills continue to quote 2.50c., Chicago, but the ruling market is 2.40c. New business in rail steel bars is light, but producers continue to adhere to 2.30c., mill.

Mill prices are: Mild steel bars, 2.50c., Chicago; common bar iron, 2.40c., Chicago; rail steel, 2.30c., Chicago mill.

Jobbers quote 3.20c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 4.55c. for rounds and 5.05c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 3c. base; hoops, 4.55c.; bands, 3.95c.

Wire Products.—The market situation shows little change, although demand for barbed wire is good and specifications from manufacturing consumers are improving. For mill prices, see finished iron and steel, f. o. b. Pittsburgh, page 642.

We quote warehouse prices f.o.b. Chicago: No. 6 to No. 9 bright basic wire, $3.90 per 100 lb.; extra for black annealed wire, 15c. per 100 lb.; common wire nails, $3.80 per 100 lb.; cement coated nails, $3.25 per keg.

Rails and Track Supplies.—Approximately 80,000 tons of rails have been purchased in the Chicago market during the week, while in the South the Louisville & Nashville has placed 30,000 tons with the Tennessee Coal, Iron & Railroad Co. The Chesapeake & Ohio is inquiring for 30,000 tons and the Hocking Valley for 5400 tons.

Standard Bessemer and open-hearth rails, $43; light rails, rolled steel, 2.25c. f.o.b. makers' mills.

Standard railroad spikes, 3.25c. mill; track bolts with square nuts, 4.25c. mill; iron tie plates, 2.85c. mill; steel tie plates, 2.60c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.90c. base and track bolts 4.90c. base.

Reinforcing Bars.—Following a quiet August, the demand for concrete bars is showing a marked revival with the approach of the fall. Lettings have been numerous during the past week and several attractive new projects have made their appearance on the market. Awards include:

Golden Rule Building, St. Paul, Minn., 600 tons to Concrete Steel Co.

Illinois Central R. R., track elevation work, 400 tons to Truscon Steel Co.

Evanston, Ill., filtration plant, 205 tons to Concrete Steel Co.

First National Bank Building, Davenport, Iowa, 200 tons to Truscon Steel Co.

Illinois State highway work, 200 tons to Truscon Steel Co.

Tuttle Building, South Bend, Ind., 200 tons (rail steel) to Pollak Steel Co.

Recitation Building, University of Iowa, Iowa City, 180 tons to Concrete Steel Co.

South Park Boulevard viaduct, Chicago, 150 tons to Barton Spiderweb System Co.

North High School Building, Minneapolis, Minn., 100 tons to C. A. P. Turner Co.

Indianapolis Times Building, Indianapolis, Ind., 100 tons to Corrugated Bar Co.

North Side Sewage Treatment Works, Sanitary District, Chicago, 6250 tons to Inland Steel Co.

Illinois State highway work, 135 tons to Concrete Steel Co.

Pending business includes:

John Marshall High School Building, Minneapolis, Minn., 600 tons.

Filtration plant, Evansville, Ind., 240 tons, bids on general contract to be taken, Sept. 6.

Alvernia High School Building, Chicago, 315 tons, general contract awarded to Barry Byrne & Ryan, Chicago.

Bolts and Nuts.—Manufacturers announced revised list prices on machine and carriage bolts, effective Sept. 1. These are the first list changes since Aug. 1, 1912. Examination of the new prices reveals that machine bolts ¾ to 1¼ in. are unchanged; 9-16 and ⅝ in. have been advanced an average of about five per cent for all lengths; ¼ to ½ in. bolts inclusive show varying advances up to a maximum of 14 per cent for lengths to 6 in., but for 6½ in. and longer have been marked up from 20 to 45 per cent. One feature of the new list as contrasted with the old one is that all prices are in multiples of five, there being no odd figures. Prices of 3-16 and ¼ in. carriage bolts in lengths 1½ to 6 in. inclusive are unchanged; for lengths 6½ to 20 in. inclusive there has been a flat advance of 75c. per 100. A flat advance of $1.30 per 100 has been made on all lengths of ¾-in. carriage bolts. For the shortest lengths the prices of 5-16 and ⅜ in. bolts are unchanged and up to 6 in. in length the advances are gradual, reaching a maximum of 10 per cent. Advances in 7/16 in. bolts range from 14 to 19 per cent for lengths up to 6 in. For lengths greater than 6 in. advances on 5/16, ⅜ and 7/16 in. bolts range from 30 to 40 per cent. Advances on 9/16 and ⅝ in. bolts average less than 5 per cent for all lengths. Advances on ½ in. bolts are negligible up to and including 6 in. lengths. For longer sizes the advances range from 10 to 15 per cent. The advances have had the effect of bringing out heavier specifications from buyers.

Coke.—The anthracite strike has stimulated demand for coke. A Michigan melter has closed for 2,500 tons of West Virginia foundry coke at $10.50, f.o.b. ovens. Connellsville foundry is selling more freely and has stiffened, now bringing from $6 to $6.50, ovens. Local by-product foundry coke remains unchanged at $13.50, delivered, Chicago switching district.

Old Material.—Speculative buying by dealers has caused a general advance in prices. Although the last heavy melting bought by a steel works did not bring more than $16.50 per gross ton, brokers have paid from 50c. to $1 a ton more. For the time being the dealers have the market to themselves, as users have thus far refused to pay the prices that are being asked. Railroad offerings include the Pennsylvania, Southwestern Region, 5500 tons; the Pennsylvania, Northwestern Region, 2500 tons; and the Michigan Central, the New York Central and the Erie, blind lists.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$21.50 to $22.00
Cast iron car wheels	20.00 to 20.50
Relaying rails, 56 and 60 lb.	28.50 to 29.50
Relaying rails, 65 lb. and heavier	32.00 to 35.00
Rolled or forged steel car wheels	22.00 to 22.50
Rails for rolling	17.50 to 18.00
Steel rails, less than 3 ft.	20.50 to 21.00
Heavy melting steel	16.50 to 17.00
Frogs, switches and guards cut apart	17.00 to 17.50
Shoveling steel	16.25 to 16.75
Drop forge flashings	11.50 to 12.00
Hydraulic compressed sheets	13.00 to 13.50
Axle turnings	13.50 to 14.00
Steel angle bars	18.50 to 19.00
Per Net Ton	
Iron angle and splice bars	22.50 to 23.00
Iron arch bars and transoms	22.50 to 23.00
Iron car axles	25.50 to 26.00
Steel car axles	18.00 to 18.50
No. 1 busheling	13.50 to 14.00
No. 2 busheling	10.00 to 10.50
Cut forge	15.00 to 15.50
Pipes and flues	10.00 to 10.50
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	15.00 to 15.50
Steel knuckles and couplers	19.50 to 20.00
Coil springs	20.50 to 21.00
No. 1 machinery cast	19.50 to 20.00
No. 1 railroad cast	18.50 to 19.00
No. 1 agricultural cast	18.50 to 19.00
Low phos. punchings	17.50 to 18.00
Locomotive tires, smooth	16.00 to 16.50
Machine shop turnings	9.00 to 9.50
Cast borings	11.00 to 11.50
Short shoveling turnings	11.00 to 11.50
Stove plate	16.00 to 16.50
Grate bars	14.00 to 14.50
Brake shoes	14.50 to 15.00
Railroad malleable	19.50 to 20.00
Agricultural malleable	17.50 to 18.00

Twenty-one teachers of engineering from as many widely separated colleges and universities spent the month of July at the East Pittsburgh works, Westinghouse Electric & Mfg. Co., renewing their contact with industry in the interest of better teaching.

New York

Pig Iron Prices Firmer, With Moderate Buying—Coke Market Stronger

NEW YORK, Sept. 4.—The largest inquiry pending in the New York pig iron market is from the American Tube & Stamping Co., Bridgeport, Conn., for from 4000 to 5000 tons of basic for last quarter delivery, which it is expected will be placed in a day or two. Sales of the past week have been moderate and owing to the holiday interruption have not got fairly started this week. The largest sale reported was for 1500 tons of foundry iron. Other sales amounted to probably not over 5000 tons, made up largely of tonnages ranging from 100 to 500, mostly for delivery in the fourth quarter, although some of the tonnage is for September and 200 or 300 tons for the first quarter of next year. Pending inquiries for foundry iron foot up about 3000 tons. Prices are firmer, with $25 the minimum at Buffalo and $25.50 the prevailing quotation on No. 2X and No. 2 plain, eastern Pennsylvania.

We quote delivered in the New York district as follows, having added to furnace prices $2.27 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 1X fdy., sil. 2.75 to 3.25	$28.77
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	27.77
East. Pa. No. 2, sil. 1.75 to 2.25	27.77
Buffalo, sil. 1.75 to 2.25	29.41
No. 2X Virginia, sil. 2.25 to 2.75	31.94
No. 2 Virginia, sil. 1.75 to 2.25	31.44

Ferroalloys.—The ferromanganese market is exceedingly quiet and quotations have been reduced to $112.50, seaboard. Demand is confined to carload and small lots. The same situation prevails in the spiegeleisen market, where prices continue as last reported. There is no demand of any consequence for 50 per cent ferrosilicon and prices are unchanged. The ferrochromium market is entirely featureless.

Cast Iron Pipe.—Firmness continues and makers of pressure pipe are booked for several months. Continued demand strengthens the belief that jobbers' stocks are low. November and December delivery is offered by one maker for medium and small sizes, but it is booked through the year on large sizes. Bids will be opened Sept. 7 on 4000 tons of 6-in. to 20-in. pipe by the Department of Water Supply, Gas and Electricity, City of New York. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $63.60; 4-in. and 5-in., $68.60; 3-in., $78.60, with $5 additional for Class A and gas pipe. Demand for soil pipe has quickened in the face of the recent price increase. Even though dullness will soon be in order, makers look for a good volume of business during the coming weeks. Most business is for immediate or 30-day delivery, and this is generally taken to signify that stocks are low. We quote discounts of both Southern and Northern makers, f.o.b. New York, in carload lots, for prompt shipment, as follows: 6-in. standard, 34½ to 35¾ per cent off list; heavy, 44½ to 45¾ per cent off list.

Warehouse Business.—Prices seem to be slightly firmer, although there is some evidence of shading on certain products. The demand for bars and structural material continues active and plates of about ⅜ in. are an active item, but this latter activity is largely attributed to the low stocks of plates in warehouses. Sheets are reported firmer and shading is said to have almost disappeared from this market. Today a fair price in the black and galvanized sheet market is 4.75c. per lb. base on black and 5.75c. per lb. base on galvanized. The market on wrought iron and steel pipe is quiet, but discounts are reported as holding firm. No change is reported in prices of brass and copper products. We quote prices on page 664.

Finished Iron and Steel.—A week normally dull was not helped in the domestic market by the shock of the Japanese calamity and even in structural lines little was placed and little new business appeared. Practically nothing was done in the railroad equipment field. As yet no progress can be reported on fourth quarter contracting. The fact that Japan in the course of some months will need steel is a firming influence and particularly in black sheets, the one item in which there has been occasional weakness. It is not expected, however, that Japan can be a buyer for a number of months.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.74c.; plates and structural shapes, 2.84c.; bar iron, 2.74c.

Coke.—The strike of anthracite coal miners has increased the demand for coke for domestic uses and the market in general is firmer, with prices a shade higher. Standard foundry coke is quotable at $6.25 to $7 for prompt delivery and furnace coke at $5 to $5.50. By-product coke from New Jersey ovens is still quoted at $11.41, Newark and Jersey City, which is on the basis of $7.50 for Connellsville coke.

Old Material.—Prices are generally firm, although there seems to be considerably less anticipation of an immediate rise in prices by the smaller dealers. No. 1 heavy melting steel shipped into eastern Pennsylvania is bringing $16 per ton delivered. Specification pipe is still firm at $16 per ton delivered to Lebanon and stove plate has shown a slight advance, New Jersey foundries now offering $18 per ton. Stove plate is still going forward to Harrisburg, but at $17.50 per ton delivered, which with a $3.78 per ton freight rate brings the buying price New York considerably lower than on the stove plate purchased for the New Jersey foundries. Borings and turnings are still fairly active and machine shop turnings are also going forward to eastern Pennsylvania consumers.

Buying prices per gross ton New York follow:

Heavy melting steel, yard	$12.00 to $12.50
Steel rails, short lengths, or equivalent	13.00 to 13.50
Rails for rolling	15.00 to 17.00
Relaying rails, nominal	25.00 to 26.00
Steel car axles	19.00 to 20.00
Iron car axles	25.00 to 26.00
No. 1 railroad wrought	14.00 to 14.50
Wrought iron track	13.50 to 14.00
Forge fire	9.50 to 10.00
No. 1 yard wrought, long	13.00 to 13.50
Cast borings (clean)	10.00 to 10.50
Machine-shop turnings	9.75 to 10.25
Mixed borings and turnings	9.50 to 10.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	11.75 to 12.25
Stove plate	14.00 to 15.00
Locomotive grate bars	12.50 to 13.50
Malleable cast (railroad)	18.00 to 19.00
Cast-iron car wheels	17.00 to 18.00

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	$20.00 to $21.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	19.00 to 20.00
No. 1 heavy cast, not cupola size	17.00 to 18.00
No. 2 cast (radiators, cast boilers, etc.)	17.00 to 18.00

Detroit Scrap Market

DETROIT, Sept. 4.—The melters in this district are still buying from hand-to-mouth on their metal requirements and the actual melt does not show much deviation from the second quarter of the year. The automotive industry shows an increase over July, with schedules pretty well set for September and October. One of the largest producers is offering approximately 2500 tons of turnings, borings, flashings and regular hydraulic compressed on a competitive basis for September delivery. Turnings and compressed are active.

The following prices are quoted on a gross ton basis, f.o.b. cars producers' yards, excepting stove plate, automobile and No. 1 machinery cast, which are quoted on a net ton basis:

Heavy melting steel	$14.00 to $15.00
Shoveling steel	14.00 to 15.00
No. 1 machinery cast	17.00 to 19.00
Cast borings	10.00 to 11.00
Automobile cast scrap	21.00 to 23.00
Stove plate	14.00 to 16.00
Hydraulic compressed	13.00 to 14.00
Turnings	10.00 to 11.00
Flashings	10.00 to 11.00

Cincinnati

Pig Iron Dull and Weak, With Low Prices on Southern Grades

CINCINNATI, Sept. 4.—There is practically no change in the pig iron market either as regards activity or price. Buyers continue to place orders for immediate needs and most of the sales reported range from carloads to lots of 100 tons. Inquiry, too, is light, one and two carloads being the general run. There is, however, one inquiry of note, a nearby melter being in the market for 2500 tons of foundry for first half of next year. This iron will probably be bought this week, as it is said the melter has intimated that he would place an order at today's price and it is understood a number of furnaces are seriously considering the proposition. Twenty-five dollars, Ironton, can still be done, while in the South $23.50. Birmingham represents the market, although the Birmingham district furnaces which had been holding for $27 have reduced their prices for September shipment to $24. One of these furnaces is reported to have sold 500 tons in Louisville at $24, but the majority of the sales are of Tennessee iron at $23.50 with some resale material said to be available at $23. There is no activity in basic or silvery irons.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$27.55
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	28.05
Ohio silvery, 8 per cent	36.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	27.27
Basic Northern	27.27
Malleable	27.27

Sheets.—Orders are more numerous, though for small tonnages. More inquiry is current for fourth quarter, and when prices are named by the leading interest, it is expected that there will be a rush to get under contract. Prices generally are holding to the regular schedule, with the exception of black sheets, quotations of 3.75c. still being made by some of the smaller mills. Reports of price shading in galvanized sheets cannot be confirmed.

Structural Material.—The only new inquiry of consequence is for the Rowland Building, Columbus, Ohio, 200 tons, bids on which closed Sept. 5. An inquiry for 100 tons for a hotel at Portsmouth, Ohio, is also current. The U. S. Engineers' Office, Louisville, Ky., will take bids Sept. 29 on six steel derrick boats, estimated to require about 900 tons. The L. & N. Railroad is expected to come into the market shortly for a small quantity of bridge work. The principal award last week was the Kresge Building, Cincinnati, 350 tons, to L. Schreiber & Sons. Fabricating shops in this district are generally in good shape for work during the next 60 days, and have fair stocks of materials on hand.

Warehouse Business.—Local jobbers report orders more numerous during the past week, with prices holding firmly.

Finished Material.—The latter part of the week brought an influx of orders, some of them of considerable tonnages, and the outlook for business in this territory is now more promising than it has been for some weeks. Some business developed in cold-finished bars and shafting, and while reports are heard that lower prices than those regularly quoted have been made, these are hardly borne out by the facts, as some buyers who supposedly have been quoted lower than 3.25c. have placed orders at this price. On plates and shapes, the price continues to be firm at 2.50c. Pittsburgh, with bars at 2.40c. A slightly improved demand for wire products is reported, but orders are not heavy. Some orders also were placed for spikes, but these were generally confined to carload lots.

Cincinnati jobbers quote: Iron and steel bars, 3.50c.; reinforcing bars, 3.60c.; hoops, 4.55c.; bands, 4.25c.; shapes, 3.60c.; plates, 3.60c.; cold-rolled rounds, 4.50c.; cold-rolled flats, squares and hexagons, 5c.; No. 10 blue annealed sheets, 4.25c.; No. 28 black sheets, 5.35c.; No. 28 galvanized sheets, 6.35c.; No. 9 annealed wire, $3.60 per 100 lb.; common wire nails, $3.60 per keg base.

Coke.—Demand for domestic fuel keeps up very well, but activity is lacking in furnace and foundry grades. We note, however, one sale of 50 cars of foundry coke for the remainder of the year. Prices are unchanged at last week's levels.

Old Material.—There is little demand from local consumers for scrap and any activity noted is directly traced to trading between dealers. Local dealers report more activity in the South and some good sales were reported in that section last week. Prices are unchanged from last week.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

	Per Gross Ton	
Bundled sheets	$13.50 to	$14.00
Iron rails	16.00 to	16.50
Relaying rails, 50 lb. and up	29.00 to	29.50
Rails for rolling	17.00 to	17.50
Heavy melting steel	15.50 to	16.00
Steel rails for melting	15.50 to	16.00
Car wheels	15.50 to	16.00
	Per Net Ton	
No. 1 railroad wrought	13.50 to	14.00
Cast borings	10.00 to	10.50
Steel turnings	9.50 to	10.00
Railroad cast	17.00 to	17.50
No. 1 machinery cast	19.50 to	20.00
Burnt scrap	12.50 to	13.00
Iron axles	22.50 to	23.00
Locomotive tires (smooth inside)	14.50 to	15.00
Pipes and flues	9.50 to	10.00

Boston

Pig Iron Sales Increase but Are Still Far from Active

BOSTON, Sept. 4.—Pig iron sales are somewhat larger, but the market is still far from active. Individual sales reported the past week in no instance exceeded 450 tons, and in a majority of cases involved car lots, with the aggregate probably in the neighborhood of 6000 tons. Western Pennsylvania furnaces are the most active with sales at $25 base and a shade lower. Buffalo iron is second in activity with $25 base being generally maintained although differentials are still occasionally disregarded. Eastern Pennsylvania iron is comparatively quiet, with most furnaces quoting $25 base with full differentials. One furnace usually active in this territory has advanced from $25 to $25.50 base and $26 for silicon 2.25 to 2.75, and $26.50 for silicon 2.75 to 3.25. Not enough business was transacted in Virginia and Alabama irons the past week to establish a market. It is intimated prices on at least one of these irons will be shortly reduced.

We quote delivered prices on the basis of the latest reported sales as follows, having added $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia, and $9.60 from Alabama.

East. Penn., sil. 2.25 to 2.75	$29.15 to $30.15
East. Penn., sil. 1.75 to 2.25	28.65 to 29.65
Buffalo, sil. 2.25 to 2.75	29.91 to 30.41
Buffalo, sil. 1.75 to 2.25	29.01 to 30.41
Virginia, sil. 2.25 to 2.75	32.42 to 32.92
Virginia, sil. 1.75 to 2.25	31.92 to 32.42
Alabama, sil. 2.25 to 2.75	35.10 to 37.10
Alabama, sil. 1.75 to 2.25	34.60 to 36.60

Coke.—The Providence Gas Co., Providence, R. I., has announced that until further notice it will sell by-product foundry coke at $13.50 a ton delivered in New England against September contract shipments. This price is the same as quoted by the company last month. The New England Coal & Coke Co., Boston, has made no official announcement regarding its September price, but it is intimated there will be no immediate change. The attitude of both producers indicates precaution made necessary by possible developments in the hard coal labor situation. They are fairly buried under orders for domestic coke. Deliveries of by-product foundry coke fell further behind the past week. Little Connellsville foundry coke is offered in this territory, but the market appears on a firmer foundation.

Old Material.—Old material dealers have been more interested in stocking up yards in preparation for an anticipated active market than they have in trying to dispose of holdings. Prices being quoted by the trade are the same as a week ago. The movement of material out of New England into Pennsylvania shows a material reduction due, presumably, to back orders having been filled. Reports of cancellations by steel

mills, therefore, are at a minimum. A New England maker of brake shoes is sounding out the market on a considerable tonnage of stove plate and is expected to buy shortly. The market for heavy melting steel shows more life than that for any other material. Borings and turnings are not coming out as freely as anticipated inasmuch as holders are waiting for higher prices.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$22.50 to $23.00
No. 2 machinery cast	20.50 to 21.00
Stove plate	16.00 to 17.00
Railroad malleable	21.00 to 21.50
Street car axles	20.00 to 21.00

The following prices are offered per gross ton lots f.o.b. Boston common rate shipping points:

No. 1 heavy melting steel	$12.00 to $12.50
No. 1 rail wrought	13.50 to 14.00
No. 1 yard wrought	12.50 to 13.00
Wrought pipe (1-in. in diam., over 2 ft. long)	11.00 to 11.50
Machine shop turnings	8.50 to 9.00
Cast iron borings, rolling mill	9.50 to 10.00
Cast iron borings, chemical	12.00 to 12.50
Blast furnace borings and turnings	8.50 to 9.00
Forged scrap and bundled skeleton	9.00 to 9.50
Shafting	18.00 to 18.50
Street car axles	18.00 to 18.50
Rails for rerolling	13.50 to 14.00

St. Louis

Local Furnace Company Advances Prices of Pig Iron and Makes Sales

ST. LOUIS, Sept. 4.—The St. Louis Coke & Iron Co., which advanced its price for pig iron to $28 to $29, Granite City, sold 1000 tons of foundry iron to a melter in the district and 300 tons in scattering lots. Another concern sold 500 tons of malleable to a local melter. Outside of these sales, business was quiet. Melters are still buying only small quantities as they need the iron, there still being a mixed sentiment as to what prices will do. Northern iron is still quoted at $27, Chicago. Three Southern makers are quoting $27, Birmingham, although very little is being sold on that basis. The companies that have been quoting $24, and less, are said to have sold up for some time at that price, and have withdrawn from the market. July sales of stove manufacturers reporting to the Federal Reserve Bank of St. Louis were 44.5 per cent larger than in July, 1922, and 19.7 per cent in excess of June, 1923. A local steel concern wants 50 to 100 tons of spiegeleisen.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.15 freight from Chicago, $3.28 from Birmingham (rail and water), $5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25	$29.16
Northern malleable, sil. 1.75 to 2.25	29.16
Basic	29.16
Southern fdy., sil. 1.75 to 2.25	$28.67 to 29.17

Finished Iron and Steel.—The Wabash Railway placed an order for 10,000 tons of 90-lb. rails with Inland Steel Co. and the Illlinois Steel Co. The San Antonio & Aransas Pass Railway bought 85 car wheels and two tons of nails. Inquiries from the railroads generally have been light. Jobbers continue to buy sparingly. Fair sized orders for bolts and nuts were placed by Texas jobbers in this market.

For stock out of warehouse we quote: Soft steel bars, 3.35c. per lb.; iron bars, 3.35c.; structural shapes, 3.45c.; tank plates, 3.45c.; No. 10 blue annealed sheets, 4.45c.; No. 28 black sheets, cold rolled, one pass, 5.20c.; cold drawn rounds, shafting and screw stock, 4.45c.; structural rivets, 4.15c.; boiler rivets, 4.25c.; tank rivets, ⅞ in. and smaller, 50-5 per cent off list; machine bolts, 45-5 per cent; carriage bolts, 40-5 per cent; lag screws, 50-5 per cent; hot pressed nuts, square or hexagon blank, $2.50; and tapped, $2.50 off list.

Coke.—The St. Louis Coke & Iron Co. announces an advance in foundry coke to $12, Granite City. Connellsville coke is reported in better demand, and prices higher as a result of this and curtailed production. Sales were made at from $6.50 to $7.50. Domestic coke is in better demand.

Old Material.—Dealers continue to take all railroad lists offered, most of their purchases being for stock. Consumers have not yet begun to buy anything except a few specialties, although they are taking a little more interest in what is going on. Competition is keen among dealers, and the railroads are getting good prices for their old material. Rails for rolling, frog switches and guards cut apart, cast iron borings, cast and railroad malleable are higher. The rest of the list is unchanged. New lists include: Dodge Brothers, Detroit, 2400 tons; Pennsylvania lines, Central region, 9000 tons; Northwestern region, 3000 tons; Southwestern region, 4000 tons; Wabash, 500 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	$16.00 to $16.50
Rails for rolling	18.00 to 18.50
Steel rails less than 3 ft.	18.50 to 19.00
Relaying rails, 60 lb. and under	26.00 to 27.00
Relaying rails, 70 lb. and over	33.50 to 34.50
Cast iron car wheels	18.50 to 19.00
Heavy melting steel	16.50 to 17.00
Heavy shoveling steel	16.50 to 17.00
Frogs, switches and guards cut apart	17.50 to 18.00
Per Net Ton	
Heavy axles and tire turnings	12.50 to 13.00
Steel angle bars	15.25 to 15.75
Iron car axles	25.00 to 26.00
Steel car axles	21.00 to 21.50
Wrought iron bars and transoms	20.00 to 21.00
No. 1 railroad wrought	15.00 to 15.50
No. 2 railroad wrought	16.50 to 17.00
Railroad springs	19.50 to 20.00
Cast iron borings	12.00 to 12.50
No. 1 busheling	16.75 to 17.25
No. 1 railroad cast	19.00 to 19.50
No. 1 machinery cast	19.00 to 19.50
Railroad malleable	17.50 to 18.00
Machine shop turnings	11.50 to 12.00
Champion bundled sheets	8.00 to 8.50

Birmingham

Nominal Price of $27 on Pig Iron Finally Abandoned—Stocks Increase

BIRMINGHAM, Sept. 4.—Early last week, one of the largest foundry iron producers of the Birmingham district reached the decision to openly quote a base price of $24 per ton, f.o.b. furnaces. By the middle of the week all other foundry iron manufacturers had reached the same decision, with the exception of one which claims not to be openly quoting the price, but will take care of old customers when and if they come in the market for their requirements. The lowering of $27 price to $24 has had some little effect thus far in closing up comparatively small size tonnages—ranging from 500 to 1000 tons. It remains to be seen what the general effect is to be. The large pipe consumers have not yet shown a disposition to "scramble in" on the $24 price. During the week the Sloss-Sheffield Steel & Iron Co. blew out two furnaces—one at Birmingham and one at Sheffield. While figures are not yet available for iron stacked on yards at the end of August, in all probability the total will be between 115,000 and 125,000 tons, as against about 85,000 tons July 31. One of the principal curtailments in Southern iron consumption has resulted from closing down of approximately 50 per cent of the soil pipe foundries. The pressure pipe foundries, stove foundries and radiator plant continue to operate on practically full time, but machinery plants and general castings plants are far below average operations.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$23.50 to $24.00
Basic	24.00
Charcoal, warm blast	33.00 to 34.00

Cast Iron Pipe.—So far as building of all kinds is concerned there has been no great falling off in the Southern and Southwestern territory, but contractors seem to be "side stepping" sanitary pipe and fittings in some form; or else the pipe plants are taking care of the business from stocks on hand at idle plants. There has been no reduction in price, though the buying public is expecting a reduction with the announcement of pig iron price reduction. The high pressure pipe plants claim to have orders on their books sufficient to keep them running through the remainder of the year at practically same rate of present operations.

Coal and Coke.—Anticipating the anthracite coal strike, coal buyers in the South and Southwest came into the market more freely for seasonal requirements than at any time since April last. Prices have not been advanced, but the volume of business transacted has increased 25 per cent to 30 per cent. There has been no change in coke prices, foundry coke being quoted nominally at $8 to $8.50 per ton at the ovens. Coke business is more or less stagnant.

Scrap.—There has been no material change in the old material market. The demand for both No. 1 and No. 2 machinery scrap constitutes 45 to 50 per cent of the total business booked. The largest buyer of steel scrap in the South is out of the market at the present time.

We quote per gross ton f.o.b. Birmingham district yards, nominal prices, as follows:

Old steel rails	$16.00 to $18.00
No. 1 steel	14.00 to 16.00
No. 1 cast	20.00 to 21.00
Tram car wheels	20.00 to 21.00
Car wheels	19.00 to 20.00
Stove plate	15.00 to 16.00
Machine shop turnings	10.00 to 12.00
Cast iron borings	10.00 to 12.00

Philadelphia

Foundry Pig Iron Advances 50 Cents—Coke Market Is Firmer

PHILADELPHIA, Sept. 4.—The strike in the anthracite coal fields has brought about firmer prices in blast furnace and foundry coke, which have now become fixed at $5 to $5.50, Connellsville ovens, for the former, with 72-hr. coke quoted at $6 to $6.50, while foundry grades of pig iron have moved up 50c. per ton. The indications seem to be for further increases in prices of coke in the immediate future, though it is not certain that pig iron prices will maintain an upward trend of so sharp a tone as is reflected in the coke market. There is an absence of a rush to either the coke or pig iron market, but unquestionably there is a greater desire to cover on fuel requirements and coke producers in the Connellsville region, evidently anticipating marked increases, are not selling beyond the third quarter. The strike also has increased, but to a lesser extent, interest in the pig iron market and consumers are accordingly putting out more inquiries and are closing for new tonnages of foundry.

Neither inquiries nor sales of pig iron have been large, but the latter have been sufficient to justify a 50c. increase in foundry grades. Fair inquiries for and one sale of 1000 tons of copper bearing low phosphorus iron have developed. Sale of foreign iron is limited and the market on Continental foundry, 2.50 to 3.25 silicon, is down to 50c. to $26, f.o.b. Philadelphia, while foreign low phosphorus is down $2.50 to $29. Domestic steel making iron is quiet, but firmer in tone, yet the absence of actual sales leaves the quotation unchanged, though an upward turn is predicted by furnace interests. It is likely also that the foundry grades of domestic iron still could be purchased at the prices quoted last week where attractive tonnages are involved, but on small and moderate sized requirements the higher prices are prevailing. The higher coke prices, it is claimed, make the increased pig iron prices mean nothing except to cover cost of production. It is a question here as to what the market will do when the anthracite strike comes to an end and bituminous coal and coke are in less demand as substitutes for anthracite. The feeling is that the strike will be of only limited duration, some forecasting that it will not last longer than 30 days, when the miners, thinking they have the better of the situation through the Pinchot plan of settlement, will return to work.

The steel market generally is quiet and production in most lines is said to exceed new business. The result has been the lightening of order books somewhat by shipping on backlog tonnages. The spread between production and consumption, however, is causing no anxiety, much of it being attributed to seasonal conditions. Railroads are ordering less, but this is due, it is stated, to the fact that they have been receiving steel tonnage faster than they can use it. For a short time they held up shipments, but have resumed now that they have taken up the slack of excess shipments. The Pennsylvania Railroad for a short time faced the situation at its Altoona shops in building and repairing cars. Steel makers deny as wholly unfounded the report that the railroads have begun a program of retrenchment and have ordered cancellations.

Pig Iron.—Increases of 50c. per ton in foundry grades of domestic iron have been brought about by the anthracite coal strike, resulting in greater inquiry for coke and bituminous coal as substitutes for domestic use and reflecting higher coke prices. The coke prices of $5 to $5.50, Connellsville ovens, for 48-hr. fuel, quoted one week ago, have become firmly fixed with a higher tendency and foundry coke is quoted at $1 over blast furnace fuel. Should the strike be of extended duration, it is the belief of the trade that coke will see further sharp rises, some predictions being that it will go as high as $7.50 to $8, ovens. This situation has increased inquiries for pig iron and brought about the advance on domestic foundry grades, based on actual sales. So far the sales have been small. It is claimed that consumers are not well covered for the fourth quarter, and stocks at furnaces are said to represent a considerable tonnage of off-iron and therefore are not considered to be an important market factor in this district. The market for basic iron is firmer in tone, but sales of consequence have not been reported. The market therefore is still quotable at $25, delivered, though some makers are asking from $25.25 to $25.50. The new prices on foundry iron are $26.26 to $26.63 for eastern Pennsylvania No. 2 plain, $26.76 to $27.13 for eastern Pennsylvania No. 2X and $27.26 to $27.63 for eastern Pennsylvania No. 1X delivered. Copper bearing low phosphorus iron has become established at the reduced price of $28, furnace, at which one maker sold 1000 tons during the past week. Small demand is being made for foreign iron and sales are limited at lower prices. Continental foundry 2.50 to 3.50 silicon is down 50c. at $26 and foreign low phosphorus is down $2.50 at $29, f.o.b. cars, Philadelphia. Imports of pig iron to Philadelphia the past week included 4986 tons from England and 507 tons from British India. The following changes have been made the past week:

Ferroalloys.—Considerable ferromanganese for resale is on the market here, although inquiries are coming to furnaces in somewhat better volume. They involve only small lots, generally 100 tons. Consumers are said to be comfortably covered with stocks and this has reacted against any marked activity. English producers last Friday announced a reduction in price to $112.50, Atlantic seaboard, and the price has been met by domestic furnaces. Standard spiegeleisen continues to be quoted at $45, furnace.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to $1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$26.26 to $26.63
East. Pa. No. 2X, 2.25 to 2.75 sil.	26.76 to 27.13
East. Pa. No. 1X	27.26 to 27.63
Virginia No 2 plain, 1.75 to 2.25 sil.	30.67 to 31.17
Virginia No. 2X, 2.25 to 2.75 sil.	31.17 to 31.67
Basic delivered eastern Pa.	25.00
Gray forge	25.50 to 26.00
Malleable	26.26 to 26.84
Standard low phos. (f.o.b. furnace)	29.00 to 30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Foreign Pig Iron

All prices f.o.b. cars Philadelphia, duty paid.

Continental foundry, 1.80 to 2.50 sil.	$25.50
Continental foundry, 2.50 to 3.25 sil.	26.00
Low phos., copper free, guar. not over 0.035 per cent phos.	29.00
Continental, phos. 1.50; sil. 2 to 3	25.50

Ore.—Imports of iron ore to the Philadelphia district during the past week included heavy shipments, 25,250 tons coming from Cuba and 23,398 tons coming from Sweden.

Bolts, Nuts and Rivets.—The market for bolts, nuts and rivets is only fair. No business of good size on the new price basis on bolts and rivets has been done in this district. Producers, however, report themselves as being satisfied with conditions and prospects. The new lists became effective Sept. 1 and makers have

published the recently adopted schedule on bolts and are about to issue the new rivet list. The list affects machine, common carriage and lag bolts and rivets. The only sizes of machine bolts affected are ¼, 5/16, ⅜, 7/16, ½ and ⅝ in. The only sizes of lag bolts affected are ¼ and 5/16 in., ⅜, 7/16 and ½ in. All sizes of common carriage bolts are affected. Increases were only slight. The most important change was to establish a structural base with a 20c. differential for boiler rivets. Deliveries of bolts, nuts and rivets are being made out of stock up to three weeks.

Semi-Finished Steel.—The market for semi-finished steel in this district is quiet. Prices continue to be quoted at $42.50, Pittsburgh, for open-hearth rerolling billets, while forging billets are quoted at $47.50 to $50, Pittsburgh.

Plates.—New business for plates is only of moderate proportions. Railroads and other consumers still are closing for requirements, but not on so large a scale as they have been. Producers are reducing tonnages on their books through shipments. For a short time some of the railroads held up shipments because they were receiving tonnages in excess of consuming capacity. The Pennsylvania Railroad up to recently found itself with greater tonnages on hand at its Altoona, Pa., shops than it could immediately use, and after stopping shipments until it caught up by expanding work at other shops, has resumed taking shipments. It is declared that the railroads have only begun to cover actual requirements and that they are expected to return to the market in the not distant future for large requirements. The market continues at 2.50c., Pittsburgh.

Iron and Steel Bars.—The market for iron and steel bars is quiet. No important business has been reported on the basis of the new schedule of extras, effective Sept. 1.

Warehouse Business.—The labor holiday has left the warehouse market quiet, but a return to normal demands is expected to develop soon. Prices remain unchanged.

Old Material.—The general tone of the market for old material is slightly firmer. The improvement, however, has not inspired any important buying movements. No. 1 heavy melting steel, bundled sheets and stove plate have increased 50c. per ton on account of transactions closed at the higher prices, but machine shop turnings for steel works use have declined 50c. It is reported that there is a scarcity of bundled sheets, a fair sized tonnage of which was sold several days ago to a nearby steel maker. One good sign in the market is the fact that neither dealers nor consumers have large stocks on hand.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$17.00 to $17.50
Scrap rails	16.50 to 17.00
Steel rails for rolling	17.00 to 18.00
No. 1 low phos., heavy 0.04 and under	22.00 to 23.00
Cast-iron car wheels	21.00 to 22.00
No. 1 railroad wrought	18.00 to 19.00
No. 1 yard wrought	18.00 to 18.50
No. 1 forge fire	14.00 to 14.50
Bundled sheets (for steel works)	14.50 to 15.00
No. 1 busheling	15.50 to 16.00
Mixed borings and turnings (for blast furnace use)	12.50 to 13.50
Machine shop turnings (for steel works use)	14.50 to 15.00
Machine shop turnings (for rolling mill use)	14.50 to 15.00
Heavy axle turnings (or equivalent)	15.00 to 15.50
Cast borings (for steel works and rolling mills)	15.00 to 15.50
Cast borings (for chemical plants)	19.00 to 20.00
No. 1 cast	21.50 to 22.00
Heavy breakable cast (for steel plants)	19.00 to 19.50
Railroad grate bars	17.00 to 18.00
Stove plate (for steel plant use)	17.50 to 18.00
Railroad malleable	19.00 to 20.00
Wrought iron and soft steel pipes and tubes (new specifications)	16.00 to 17.00
Shafting	22.00 to 24.00
Steel axles	24.00 to 26.00

Structural Material.—Inquiries for small sized tonnages of structural material have increased the past and some makers report that they are more brisk than they have been for a long period. Mills are catching up on backlog business and with better facilities available are making heavier shipments. The only sizable job awarded the past week involved 1500 tons for a building in Philadelphia for the Pennsylvania Sugar Refining Co. The business went to the McClintic-Marshall Co. The general market still is quoted at 2.50c., Pittsburgh, although one Eastern maker continues to quote 2.40c. for desirable tonnage.

Cleveland

Semi-Finished Material More Active—Pig Iron Buying of Small Lots

CLEVELAND, Sept. 4.—Iron ore shipments fell off slightly during August, the movement for the month being 10,296,133 gross tons as compared with 10,411,248 tons during July. The August movement has been exceeded only in one month previous to July and was the fifth month in which shipments have exceeded 10,000,000 tons. The August movement was 1,279,707 tons less than in August, 1922. The movement up to Sept. 1 was 36,892,864 tons, an increase of 10,882,925 tons, or 40 per cent over the corresponding period last year.

Pig Iron.—Furnaces continued to book a good volume of orders monthly for foundry iron, but buying is in smaller lots than during the few previous weeks and the aggregate tonnage booked has fallen off. Sales during the week included one 1000-ton lot, but for the most part were for lots less than 500 tons. Some consumers are buying for the remainder of the year and others only for early deliveries, their purchases being limited to the requirements of orders for castings already on their books. Prices are being maintained close to recent levels. Locally foundry iron is quoted at $25 for outside shipment and $25.50 at furnace for local delivery, although some Cleveland consumers seem to have been able to buy at the latter price delivered. In the Valley and southern Ohio districts $25 is the common quotation, but it is doubtful whether the $24.50 price reported last week has disappeared. While consumers of foundry and malleable iron generally are taking all the iron they have purchased, some consumers of basic iron are holding up shipments. Small lot sales of Southern iron are reported at $23.50 for Tennessee and $24 for Alabama iron. The Hanna Furnace Co. will blow out its Dover furnace about Aug. 15.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and $6 rate from Birmingham:

Basic, Valley furnace	$25.00
Northern No. 2 fdy., sil. 1.75 to 2.25	$25.50 to 26.00
Southern fdy., sil. 1.75 to 2.25	29.50
Malleable	25.50 to 26.00
Ohio silvery, 8 per cent	37.52
Standard low phos., Valley furnace	31.00 to 32.00

Sheets.—Some of the mills report an improvement in demand, but several are in need of orders. Regular prices appear to be holding firm except on black sheets, which some mills are still quoting at 3.75c.

Bolts, Nuts and Rivets.—Bolt and nut makers are getting a good volume of specifications, but mostly for small lots. Prices are firm at the quoted discounts. A market test of the revised list of rivet extras has not yet been made. The announcement of the new extras had the effect of bringing out considerable business before Sept. 1, when the change became effective.

Warehouse Business.—There is considerable irregularity in sheet prices. Quotations are being made down to 4.40c. on black, 5.40c. on galvanized and 3.60c. on blue annealed sheets.

Finished Iron and Steel.—Some of the mills report an improvement in the demand, but buying is confined almost wholly to small lots. A canvass of some of the larger consumers in the bolt and nut and automobile accessory fields in this territory by a steel interest has brought report from these manufacturers that they expect a very good volume of business during the remainder of the year. Inquiries for round tonnages for

building and other specific work are lacking. Deliveries of some products continue to improve, particularly hoops and bands and bars in some sizes on which one leading producer is now promising shipments in four to six weeks. Structural shops have been able to obtain concessions of $2 a ton to 2.40c. on bar size angles and this quotation now seems to be general. Otherwise prices are firm at regular quotations. The demand for plates in small lots for prompt shipment is fair. Car lot orders are being booked by Eastern mills at 2.50c. at mill for quick delivery. Quotations on rail steel reinforcing bars range from 2.25c. to 2.30c.

Jobbers quote steel bars, 3.36c.; plates and structural shapes, 3.46c.; No. 9 galvanized wire, 3.70c.; No. 9 annealed wire, 3.25c.; No. 28 black sheets, 4.40c. to 4.65c.; No. 28 galvanized sheets, 5.50c. to 5.80c.; No. 10 blue annealed sheets, 3.75c. to 4.06c.; cold rolled rounds, 3.90c.; flats, squares and hexagons, 4.40c.; hoops and bands, 1 in. and wider and 20 gage or heavier, 4.16c.; narrower than 1 in. or lighter than No. 20 gage, 4.60c.

Semi-Finished Steel.—The market is more active than for some time. We note the sale of 6000 tons of slabs and billets per month for the fourth quarter and one lot of 8000 tons of sheet bars and other lots aggregating about 4000 tons for the same delivery at $42.50. The market seems well established at that price, although a Cleveland consumer is understood to have purchased billets at $42 delivered.

Coke.—The foundry coke market is firm, with producers quoting standard Connellsville coke at $7 to $7.50, but only for spot shipment.

Old Material.—Prices have further advanced from 25c. to $1 a ton on most grades. The market is fairly active in heavy melting steel, borings and turnings, and compressed sheet steel, but the activity is largely on the part of dealers who in many cases are paying fully as much for scrap as mills are willing to pay. While there is some buying by the mills, the advance in prices seems to have been due largely to the release of material by consumers on old contracts. Some mills that have been holding up scrap are now taking material freely. Dealers are offering $19 for heavy melting steel for Youngstown district delivery and as high as $19.50 has been paid, although one consumer outside of the Valley district has bought this grade at $18.50. Dealers are offering $18 for heavy melting steel for Cleveland delivery. A local mill is offering $13 delivered for turnings which is below dealers present asking prices.

We quote dealers prices f.o.b. Cleveland per gross ton:

Heavy melting steel	$17.75 to $18.00
Rails for rolling	20.00 to 20.50
Rails under 3-ft	19.50 to 20.00
Low phosphorus melting	20.50 to 21.00
Cast borings	13.50 to 14.00
Machine shop turnings	13.00 to 13.25
Mixed borings and short turnings	13.25 to 13.50
Compressed sheet steel	15.00 to 15.50
Railroad wrought	16.00 to 16.50
Railroad malleable	22.00 to 22.50
Light bundle sheet stampings	12.00 to 12.50
Steel axle turnings	16.00 to 16.75
No. 1 cast	21.00 to 22.00
No. 1 busheling	13.00 to 13.25
Drop forge flashings	13.25 to 13.75
Railroad grate bars	16.00 to 17.00
Stove plate	16.00 to 17.00
Pipes and flues	13.50 to 14.00

Trade Changes

The United States Electrical Tool Co. has opened an office in Toledo, Ohio, at 110-12 Eleventh Street. J. E. Hauser has been appointed district manager.

J. R. Collins has resigned his position as purchasing agent of the Liberty Motor Car Co. and has purchased the plant of the Detroit Appliances Co., which he has reincorporated under the name of the Collins Stamping & Mfg. Co. and will engage in the manufacture of light stampings, extention lamps, closed car window regulators and household electrical appliances.

The E. L. Essley Machinery Co., 555 West Washington Boulevard, Chicago, has been appointed exclusive agent for the sale of engine lathes manufactured by the Sidney Machine Tool Co., Sidney, Ohio, in Chicago territory, including Wisconsin, the western half of Michigan, the northern halves of Indiana and Illinois, and Iowa.

Briggs & Turivas, Westminster Building, Chicago, have purchased all the forging bars, alloy bars, strip steel and sheets in stock at the plant of the Mitchell Motors Co., Racine, Wis., which recently went into the hands of receivers. Over 1600 tons was involved in the purchase.

Agnew, Batteiger & Co., Widener Building, Philadelphia, dealers in pig iron, ores, scrap, etc., have opened an office in Washington, at 1211 Woodward Building, in charge of Herbert H. Moffitt, and an office in Pittsburgh, at 1601 Oliver Building, in charge of M. E. Nolan. Mr. Moffitt formerly represented the Midvale Steel & Ordnance Co. in Washington and Mr. Nolan was in charge of pig iron sales in the Pittsburgh territory for the Midvale and Cambria furnaces.

Plans of New Companies

The Miller Traffic Expediting Service has been organized, with offices at 1642 Widener Building, by George Irvin Miller, who was for several years transportation director under H. C. Crawford, general traffic manager of the Midvale Steel & Ordnance Co. Mr. Miller was before that associated with the operating department of the Pennsylvania Railroad and the Philadelphia & Reading and the Greater Northern Railroads.

The Pacific Brass & Hardware Mfg. Co., Los Angeles, Cal., was first organized in 1908 and recently, in order to refinance, the Delaware corporation was organized. It is not at present in the market for equipment. The officers are: Lester C. Hicks, president, general manager; W. E. Sprague, vice-president; Fred E. Subith, attorney, secretary-treasurer; Jack I. Cairns, sales manager.

COMING MEETINGS

September

Chemical Industries. Sept. 17 to 22. National exposition, Grand Central Palace, New York.

Machine Tool Exhibition. Sept. 18 to 21. Mason Laboratory, Yale University, New Haven. New Haven Branch, American Society of Mechanical Engineers, 400 Temple Street, New Haven, Conn., in charge.

Association of Iron and Steel Electrical Engineers. Sept. 24 to 28. Convention and exhibition Broadway Auditorium, Buffalo. J. F. Kelly, 1007 Empire Building, Pittsburgh, secretary.

American Electrochemical Society. Sept. 27 to 29. Annual meeting, Dayton Ohio. Dr. Colin G. Fink, Columbia University, New York, secretary.

October

National Safety Council. Oct. 1 to 5. Twelfth annual meeting, New Statler Hotel, Buffalo. W. H. Cameron, 168 North Michigan Avenue, secretary.

American Society for Steel Treating. Oct. 8 to 12. Annual convention, Motor Square Garden, Pittsburgh. W. H. Eisenman, 4600 Prospect Avenue, Cleveland, secretary.

American Society of Mechanical Engineers. Oct. 23 and 24. Regional meeting, Chattanooga, Tenn. E. C. Patterson, general manager Chattanooga Boiler & Tank Co., Chattanooga, in charge of details.

West Virginia and Kentucky Association of Mining, Mechanical and Electrical Engineers. Oct. 19 and 20. Third annual convention, Hotel Frederick, Huntington, W. Va.

National Association of Farm Equipment Manufacturers. Oct. 24, 25 and 26. Thirteenth annual convention. Statler Hotel, Cleveland. J. B. Bartholomew, Peoria, Ill., president.

American Management Association. Oct. 29 to Nov. 1. Annual convention, Hotel Astor, New York. W. J. Donald, 20 Vesey Street, managing director.

Prices Finished Iron and Steel f.o.b. Pittsburgh

Carload Lots

Plates

Sheared, tank quality, base, per lb.....2.50c.

Structural Material

Beams, channels, etc., base, per lb.....2.50c.
Sheet piling .....2.65c.

Iron and Steel Bars

Soft steel bars, base, per lb.....2.40c.
Soft steel bars for cold finishing.....$3 per ton over base
Reinforcing steel bars, base .....2.40c.
Refined iron bars, base, per lb.....3.25c.
Double refined iron bars, base, per lb.....4.85c. to 5.00c.
Stay bolt iron bars, base, per lb.....8.00c. to 8.50c.

Hot-Rolled Flats

Hoops, ordinary gages and widths, base, per lb.....3.15c.
Bands, base, per lb.....3.15c.
Strips, base, per lb.....3.00c. to 3.15c.
Cotton ties, per bundle of 45 lb.....$1.62

Cold-Finished Steels

Bars and shafting base, per lb.....3.25c.
Bars, S. A. E. Series, No. 2100.....4.50c. to 4.75c.
Bars, S. A. E. Series, No. 2300.....6.50c. to 6.75c.
Bars, S. A. E. Series, No. 3100.....5.50c. to 5.75c.
Strips, base, per lb.....5.00c.

Wire Products

Nails, base, per keg.....$3.00
Galvanized nails, 1 in. and over.....$2.25 over base
Galvanized nails, less than 1 in..... 2.50 over base
Bright plain wire, base, No. 9 gage, per 100 lb..... 2.75
Annealed fence wire, base, per 100 lb..... 2.90
Spring wire, base, per 100 lb..... 3.70
Galvanized wire, No. 9, base, per 100 lb..... 3.35
Galvanized barbed, base, per 100 lb..... 3.80
Galvanized staples, base, per keg..... 3.80
Painted barbed wire, base, per 100 lb..... 3.45
Polished staples, base, per keg..... 3.45
Cement coated nails, base, per count keg..... 2.70
Woven fence, carloads (to jobbers)....67½ per cent off list
Woven fence, carloads (to retailers).....65 per cent off list

Carriage Bolt List

Effective Sept. 1, 1923

Diam. Length	1/4 and 5/16 in.	7/16 in.	3/8 in.	7/16 in.	1/2 in.	5/8 and 3/4 in.	7/8 in.
1½ in.	$1.00	$1.40	$1.90	$2.50	....	....	....
2 in.	1.10	1.55	2.10	2.75	....	....	....
2½ in.	1.20	1.70	2.30	3.00	$3.25	$6.00	$9.80
3 in.	1.30	1.85	2.50	3.25	3.55	6.40	10.30
3½ in.	1.40	2.00	2.70	3.50	3.85	6.80	10.80
4 in.	1.50	2.15	2.90	3.75	4.15	7.20	11.30
4½ in.	1.60	2.30	3.10	4.00	4.45	7.60	11.80
5 in.	1.70	2.45	3.30	4.25	4.75	8.00	12.30
5½ in.	1.80	2.60	3.50	4.50	5.05	8.40	12.80
6 in.	1.90	2.75	3.70	4.75	5.35	8.80	13.30
6½ in.	2.75	3.65	4.65	5.75	6.40	9.20	13.80
7 in.	2.85	3.80	4.85	6.00	6.70	9.60	14.30
7½ in.	2.95	3.95	5.05	6.25	7.00	10.00	14.80
8 in.	3.05	4.10	5.25	6.50	7.30	10.40	15.30
8½ in.	3.15	4.25	5.45	6.75	7.60	10.80	15.80
9 in.	3.25	4.40	5.65	7.00	7.90	11.20	16.30
9½ in.	3.35	4.55	5.85	7.20	8.20	11.60	16.80
10 in.	3.45	4.70	6.05	7.50	8.50	12.00	17.30
11 in.	3.65	5.00	6.45	8.00	9.10	12.80	18.30
12 in.	3.85	5.30	6.85	8.50	9.70	13.60	19.30
13 in.	4.05	5.60	7.25	9.00	10.30	14.40	20.30
14 in.	4.25	5.90	7.65	9.50	10.90	15.20	21.30
15 in.	4.45	6.20	8.05	10.00	11.50	16.00	22.30
16 in.	4.65	6.50	8.45	10.50	12.10	16.80	23.30
17 in.	4.85	6.80	8.85	11.00	12.70	17.60	24.30
18 in.	5.05	7.10	9.25	11.50	13.30	18.40	25.30
19 in.	5.25	7.40	9.65	12.00	13.90	19.20	26.30
20 in.	5.45	7.70	10.05	12.50	14.50	20.00	27.30

Welded Pipe

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅜ ....+11		+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3.....	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12 ...	53	40½			

Butt Weld, extra strong, plain ends

¼	41	24½	2 to 3	61	50½
¼ to ⅜	47	30½	¼ to ⅜ .....+19		+54
½	53	42½	½	21	7
¾	58	47½	¾	28	12
1 to 1½.....	60	49½	1 to 1½	30	14

Lap Weld, extra strong, plain ends

2	53	42½	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10.....	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 per cent on black and 1½ points, with a supplementary discount of 5 per cent, on galvanized.

Boiler Tubes

Lap Welded Steel

		Charcoal Iron	
2 to 2¼ in.....	27	1¼ in. .....+18	
2½ to 2¾ in.....	37	1⅞ to 1⅞ in.....+ 8	
3 in.	40	2 to 2¼ in.....— 2	
3¼ to 3¾ in.....	42½	2½ to 3 in.....— 7	
4 to 13 in.....	46	3¼ to 4½ in.....— 9	

Less carload lots 4 points less.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	55	3 and 3½ in.....	36
1¼ and 1½ in.....	47	3½ and 3¾ in.....	37
1¾ in.	31	4 in.	41
2 and 2¼ in.....	22	4½ in. and 5 in.....	33
2½ and 2¾ in.....	32		

Hot Rolled

3 and 3¼ in.....	38	4 in.	43
3½ in. and 3¾ in....	39		

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of net larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base .....83 per cent off list
Carbon 0.30 to 0.40, base.....81 per cent off list

Plus usual differentials and extras for cutting. Warehouse discounts range higher.

Seamless Locomotive and Superheater Tubes

Cents per Ft.		Cents per Ft.	
2-in. O.D. 12 gage....	15	2¼-in. O.D. 10 gage..	20
2-in. O.D. 11 gage....	16	3-in. O.D. 7 gage....	35
2-in. O.D. 10 gage....	17	1½-in. O.D. 9 gage..	15
2¼-in. O.D. 12 gage..	17	5¾-in. O.D. 9 gage..	55
2¼ in. O.D. 11 gage..	18	5½-in. O.D. 9 gage..	57

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb.....3.00c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb.....3.75c. to 3.85c.

Automobile Sheets

Regular auto body sheets, base (22 gage), per lb.....5.35c.

Galvanized

No. 28 (base), per lb.....5.00c.

Long Ternes

No. 28 gage (base), 8-lb. coating per lb.....5.30c.

Tin-Mill Black Plate

No. 28 (base), per lb.....3.85c.

Manufacturers have pamphlets which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Revised Machine Bolt List

Effective Sept. 1, 1923

Diameter Length	1/4 in.	5/16 in.	3/8 in.	7/16 in.	1/2 in.	5/8 and 9/16 in.	3/4 in.	7/8 in.	1 in.	1⅛ in.	1¼ in.
1½ in.	$1.70	$2.00	$2.40	$3.00	$3.70	$5.50	$7.70	$10.50	$15.10	$22.50	$30.00
2 in.	1.80	2.10	2.60	3.25	4.00	5.90	8.25	11.20	16.00	23.70	31.50
2½ in.	1.90	2.30	2.80	3.50	4.30	6.30	8.80	11.90	16.90	24.90	33.00
3 in.	2.00	2.45	3.00	3.75	4.60	6.70	9.35	12.60	17.80	26.10	34.50
3½ in.	2.10	2.60	3.20	4.00	4.90	7.10	9.90	13.30	18.70	27.30	36.00
4 in.	2.20	2.75	3.40	4.25	5.20	7.50	10.45	14.00	19.60	28.50	37.50
4½ in.	2.30	2.90	3.60	4.50	5.50	7.90	11.00	14.70	20.50	29.70	39.00
5 in.	2.40	3.05	3.80	4.75	5.80	8.30	11.55	15.40	21.40	30.90	40.50
5½ in.	2.50	3.20	4.00	5.00	6.10	8.70	12.10	16.10	22.30	32.10	42.00
6 in.	2.60	3.35	4.20	5.25	6.40	9.10	12.65	16.80	23.20	33.30	43.50
6½ in.	3.70	4.50	5.40	6.50	7.70	9.50	13.20	17.50	24.10	34.50	45.00
7 in.	3.80	4.65	5.60	6.75	8.00	9.90	13.75	18.20	25.00	35.70	46.50
7½ in.	3.90	4.80	5.80	7.00	8.30	10.30	14.30	18.90	25.90	36.90	48.00
8 in.	4.00	4.95	6.00	7.25	8.60	10.70	14.85	19.60	26.80	38.10	49.50
9 in.	4.20	5.25	6.40	7.75	9.20	11.50	15.95	21.00	28.60	40.50	52.50
10 in.	4.40	5.55	6.80	8.25	9.80	12.30	17.05	22.40	30.40	42.90	55.50
11 in.	4.60	5.85	7.20	8.75	10.40	13.10	18.15	23.80	32.20	45.30	58.50
12 in.	4.80	6.15	7.60	9.25	11.00	13.90	19.25	25.20	34.00	47.70	61.50
13 in	....	....	8.00	9.75	11.60	14.70	20.35	26.60	35.80	50.10	64.50
14 in.	....	....	8.40	10.25	12.20	15.50	21.45	28.00	37.60	52.50	67.50
15 in.	....	....	8.80	10.75	12.80	16.30	22.55	29.40	39.40	54.90	70.50
16 in.	....	....	9.20	11.25	13.40	17.10	23.65	30.80	41.20	57.30	73.50
17 in.	....	....	....	....	14.00	17.90	24.75	32.20	43.00	59.70	76.50
18 in.	....	....	....	....	14.60	18.70	25.85	33.60	44.80	62.10	79.50
19 in.	....	....	....	....	15.20	19.50	26.95	35.00	46.60	64.50	82.50
20 in.	....	....	....	....	15.80	20.30	28.05	36.40	48.40	66.90	85.50

Prices of Raw Materials, Semi-Finished and Finished Products

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron	$6.45
Old range non-Bessemer, 51½ per cent iron	5.70
Mesabi Bessemer, 55 per cent iron	6.20
Mesabi non-Bessemer, 51½ per cent iron	5.55

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian	11½c.
Iron ore, Swedish, average 66 per cent iron	10.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus, nominal	43c.
Manganese ore, ordinary, 48 per cent manganese, from the Caucasus	41c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, per unit, in 60 per cent concentrates	$8.50
Chrome ore, basic, 48 per cent Cr_2O_3, crude, per ton, c.i.f. Atlantic seaboard	$18.00 to 28.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	75c. to 85c.

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton	$112.50
Ferromanganese, British, 80 per cent, f.o.b. Atlantic port, duty paid	112.50
Spiegeleisen, domestic, 19 to 21 per cent, per ton, furnace	$45.00 to 47.50
Spiegeleisen, domestic, 16 to 19 per cent, furnace, per ton	44.00 to 46.50
Ferrosilicon, 50 per cent, delivered, per gross ton	82.50
Ferrosilicon, Bessemer, 10 per cent, per ton, furnace	43.50
Ferrosilicon, Bessemer, 11 per cent, per ton, furnace	46.80
Ferrosilicon, Bessemer, 12 per cent, per ton, furnace	50.10
Ferrosilicon, Bessemer, 13 per cent, per ton, furnace	54.10
Ferrosilicon, Bessemer, 14 per cent, per ton, furnace	59.10
Silvery iron, 6 per cent, per ton, furnace	32.00
Silvery iron, 7 per cent, per ton, furnace	33.00
Silvery iron, 8 per cent, per ton, furnace	34.50
Silvery iron, 9 per cent, per ton, furnace	36.50
Silvery iron, 10 per cent, per ton, furnace	38.50
Silvery iron, 11 per cent, per ton, furnace	41.80
Silvery iron, 12 per cent, per ton, furnace	45.10
Ferrotungsten, per lb. contained metal	88c. to 90c.
Ferrochromium, 4 to 6 per cent carbon, 60 to 70 per cent Cr. per lb. contained Cr. delivered	12c.
Ferrochromium, 6 to 7 per cent carbon, 60 to 70 per cent Cr., per lb	11.50c.
Ferrovanadium, per lb. contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, per net ton	200.00

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	$22.00
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	23.50

Per 1000 f.o.b. works:

	High Duty	Moderate Duty
Fire Clay:		
Pennsylvania	$46.00 to $48.00	$40.00 to $45.00
Maryland	50.00	45.00
Ohio	45.00 to 46.00	40.00 to 42.00
Kentucky	45.00 to 46.00	40.00 to 42.00
Illinois	48.00	45.00
Missouri	48.00 to 50.00	38.00 to 43.00
Ground fire clay, per net ton		6.50 to 9.50
Silica Brick:		
Pennsylvania		42.00 to 45.00
Chicago		52.00
Birmingham		53.00
Ground silica clay, per net ton		10.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)		65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)		40.00
Chrome Brick:		
Standard size, per net ton		50.00

Semi-Finished Steel, f.o.b. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over	$40.00 to $42.50
Rolling billets, 2-in. and under	40.00 to 42.50
Forging billets, ordinary carbons	47.50
Sheet bars, Bessemer	42.50
Sheet bars, open-hearth	42.50
Slabs	$42.50
Wire rods, common soft, base, No. 5 to ¼-in.	51.00
Wire rods, common soft, coarser than ¼-in.	$2.50 over base
Wire rods, screw stock	$5 per ton over base
Wire rods, carbon 0.20 to 0.40	$3 per ton over base
Wire rods, carbon 0.41 to 0.55	$5 per ton over base
Wire rods, carbon 0.56 to 0.75	$7.50 per ton over base
Wire rods, carbon over 0.75	$10 per ton over base
Wire rods, acid	$15 per ton over base
Skelp, grooved, per lb.	2.40
Skelp, sheared, per lb.	2.40
Skelp, universal, per lb.	2.40

Finished Iron and Steel, f.o.b. Mill

Rails, heavy, per gross ton	$43.00
Rails, light, new steel, base, per lb.	2.25c.
Rails, light, rerolled base, per lb.	1.90c. to 2.00c.
Spikes, ⅝-in. and larger, base, per 100 lb.	$3.15
Spikes, ½-in., ⅞-in. and ⅝-in., base per 100 lb.	$3.25 to 3.50
Spikes, ⅜-in., base, per 100 lb.	3.25 to 3.50
Spikes, boat and barge, base, per 100 lb.	3.50 to 3.75
Track bolts, ⅝-in. and smaller, base, per 100 lb.	4.15 to 4.50
Track bolts, ¾-in. and larger, base, per 100 lb.	4.75 to 5.50
Tie plates, per 100 lb.	2.55 to 2.60
Angle bars, per 100 lb.	2.75
Bars, common iron, base, per lb., Chicago mill	2.50c.
Bars, common iron, Pittsburgh mill	2.40c.
Bars, rails, steel reinforcing, base, per lb.	2.15c. to 2.25c.
Ground shafting, base, per lb.	3.65c.
Cut nails, base, per keg	$3.15 to $3.25

S. A. E. Semi-finished Castellated Nuts and U. S. S. Semi-finished Slotted Nuts

(To jobbers and consumers in large quantities f.o.b. Pittsburgh)

	Per 1000 S. A. E.	Per 1000 U. S. S.
¼-in.	$4.80	$4.80
5/16-in.	5.50	6.00
⅜-in.	6.50	7.00
7/16-in.	9.00	9.50
½-in.	11.00	11.50
9/16-in.	15.00	15.00
⅝-in.	19.50	20.00
¾-in.	28.50	28.50
⅞-in.	37.00	37.50
1 in.	58.50	60.50
1⅛-in.	88.00	97.00
1¼-in.	132.00	132.00
1⅜-in.	176.00	176.00
1½-in.	220.00	220.00

Larger sizes—Prices on application

Alloy Steel

S.A.E. Series Numbers	Bars 100 lb.
2100*(½% Nickel, 10 to 20 per cent Carbon)	$3.25 to $3.50
2300 (3½% Nickel)	5.25 to 5.50
2500 (5% Nickel)	7.75 to 8.00
3100 (Nickel Chromium)	4.25 to 4.50
3200 (Nickel Chromium)	6.00 to 6.25
3300 (Nickel Chromium)	8.00 to 8.25
3400 (Nickel Chromium)	7.00 to 7.25
5100 (Chromium Steel)	3.75 to 4.00
5200*(Chromium Steel)	8.00 to 8.25
6100 (Chromium Vanadium bars)	5.00 to 5.25
6100 (Chromium Vanadium spring steel)	4.75 to 5.00
9250 (Silico Manganese spring steel)	3.75 to 4.00
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chromium, 0.15 Vanadium)	5.25 to 5.50
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum)	4.50 to 4.75
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	4.25 to 4.50
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum)	4.25 to 4.50

Above prices are for hot-rolled alloy steel bars, forging quality, per 100 lb. f.o.b. Pittsburgh. Billets 4 x 4 in. and larger are $10 per gross ton less than net ton price for bars of same analyses. On smaller than 4 x 4-in. billets down to and including 2½-in. sq. there is a size extra of $10 per gross ton; on billets smaller than 2½-in. sq., the net ton bar price applies.

*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

FABRICATED STEEL BUSINESS

Awards Over 16,000 Tons and Inquiries for 7000 Tons

Awards of some sixteen projects in fabricated steel work in the past week cover 16,000 tons. Over half is for private buildings and one-fourth for public service institutions. Most of the fresh inquiries, totaling nearly 7000 tons, are for private ownership. The awards include:

Long Island Railroad, bridge work, 150 tons, to Harris Structural Co.

Pennsylvania Sugar Co., warehouse, Philadelphia, 1500 tons, to McClintic-Marshall Co.

Edison Electric Illuminating Co., Boston, power house, 500 tons, to Jones & Laughlin Steel Corporation.

Seaboard Air Line, bridge work, 250 tons, to unnamed fabricator.

Isbell-Porter Co., Buffalo, retort house, 900 tons, to Bethlehem Steel Bridge Corporation.

Chesapeake & Ohio Railroad, 200 tons, to Bethlehem Steel Bridge Corporation.

Friedenburg loft, Forty-seventh Street, New York, 1100 tons, to Hay Foundry & Iron Works.

Apartment-hotel, Sonn Brothers, New York, 1200 tons, to Hay Foundry & Iron Works.

Elks' Club Building, San Francisco, Cal., 1280 tons, to Golden Gate Iron Works.

Sewage disposal plant, Sanitary District, Chicago, 750 tons, to Continental Bridge Co.

Courthouse and jail, Cedar Rapids, Iowa, 610 tons, to Iowa Steel & Iron Works.

Western United Gas & Electric Co., power house, Aurora, Ill., 160 tons, to Garbe Iron Works.

Fair Store, Chicago, girders for shoring up walls, 140 tons, to Hansell-Elcock Co.

Don M. Morris, 13-story apartment building, Wilshire and Catalina Streets, Los Angeles, Cal., 1500 tons, reinforced concrete construction substituted for fabricated steel.

Apartment-hotel building on East Ocean Avenue, Long Beach, Cal., 1000 tons, reinforced concrete construction substituted.

Graystone Apartment Co., 14-story apartment-hotel, Hollywood, Cal., 1000 tons, reinforced construction substituted.

Milwaukee Gas Light Co., gas holder, 3000 tons (shapes and plates), to Riter-Conley Co.

Milwaukee Electric Railway & Light Co., boiler house addition, 160 tons, to Wisconsin Bridge & Iron Co.

Kresge Building, Cincinnati, 350 tons, to L. Schreiber & Sons.

Ford Motor Co., first unit of steel plant, Detroit, 3700 tons, to McClintic-Marshall Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Pennsylvania Railroad, machine shop, Olean, N. Y., 150 tons.

Office building, Jersey City, 1100 tons.

Glens Falls Portland Cement Co., Glens Falls, N. Y., 250 tons.

Henry L. Doherty & Co., in Colorado, 500 tons.

Mead, Morrison & Co., Chicago, coal unloader, for Milwaukee, 1700 tons.

Union Pacific, plate girder spans, 150 tons.

Goss Printing Press Co., Chicago, addition, 300 tons.

State highway bridge, Peshtigo, Wis., 180 tons, bids close Sept. 13.

Rowland Building, Columbus, Ohio, 200 tons, bids opened Sept. 5.

Hurth Hotel, Portsmouth, Ohio, 100 tons, bids being taken.

U. S. Engineers' Office, Louisville, Ky., six steel derrick boat hulls, about 900 tons, bids close Sept. 29.

Knights of Columbus Building, Rochester, N. Y., 1200 tons, revised bids taken.

Little Railroad Equipment Buying

The Central Railroad of New Jersey has awarded repairs on 200 steel underframes to the Pressed Steel Car Co. The St. Louis Southwestern is inquiring for four coaches, two baggage cars, two baggage and mail cars and one cafe and observation car. The Minnesota Steel Co. has awarded 20 flat cars to the Standard Steel Car Co.

Locomotives in need of repair on Aug. 15, totaled 11,571 or 18.1 per cent of the number on line, according to reports filed by the carriers with the car service division of the American Railway Association.

This was an increase of 16 locomotives over the number in need of repair on Aug. 1.

Lake Iron Ore Shipments in August

Shipments of iron ore from the Lake Superior region in August were larger than those in August, 1922. This year they were 10,296,133 gross tons, which compares with 9,016,426 tons in August, 1922. This increase over last year was therefore 1,279,707 tons or 14.19 per cent. The totals by ports, with season shipments and a comparison with 1922, are given below:

	August, 1923	August, 1922	To Sept. 1, 1923	To Sept. 1, 1922
Escanaba	875,772	900,975	3,995,467	2,505,105
Marquette	442,370	465,380	1,778,343	1,314,145
Ashland	1,081,635	1,134,577	4,149,251	3,713,633
Superior	3,359,005	2,338,080	11,007,586	6,703,043
Duluth	3,498,358	2,896,979	11,823,332	8,023,724
Two Harbors ..	1,038,993	1,280,435	4,138,885	4,050,289
Total	10,296,133	9,016,426	36,892,864	26,309,939
Increase	1,279,707		10,582,925	

The increase in season shipments to Sept. 1, 1923, has been 10,582,925 tons or 40.22 per cent as compared with an increase for the same period a year ago of 11,561,867 tons or 78.39 per cent.

Of the season's total to Sept. 1, the Great Northern dock contributed 26.36 per cent as against 22.90 per cent a year ago. Duluth is credited this year with 32.05 per cent of this season's total as compared with 30.49 per cent a year ago.

Introducing Three Shifts at Cleveland

CLEVELAND, Sept. 3.—Considerable progress in the elimination of the 12-hr. day has already been made in the Cleveland district by plants of the American Steel & Wire Co. and in the Lorain plant of the National Tube Co. The former company is gradually placing the reduced working hours in effect in its blast furnace, open-hearth, coke oven and continuous galvanizing departments. The National Tube Co. already has its coken oven plant and pipe mill operating entirely on an 8-hr. schedule. The McKinney Steel Co. during the week made a start in establishing the 8-hr. day in the open-hearth department of its Cleveland steel plant and plans to gradually introduce the shorter day in the other departments that are now operating on a 12-hr. schedule.

While sufficient labor is not available to entirely eliminate immediately the 12-hr. day in Cleveland plants, the labor supply is fair and mills are getting men about as fast as they are needed for placing the three shifts in effect. The shorter day is attracting considerable labor that heretofore has not been employed in the steel industry.

Youngstown Plant Activities

Youngstown, Sept. 4.—Independent iron and steel makers in the Youngstown district quite generally observed the Labor Day holiday by suspensions, except in departments, such as blast furnaces, open hearth furnaces and by-product coke ovens, requiring continuous operation. Plants of the Carnegie Steel Co. operated as usual.

There is considerable piling of iron by blast furnaces in this territory and further suspensions in this direction are not unlooked for, in event iron demand does not improve.

Of the 66 open hearth furnaces in the Mahoning Valley, 56 were melting at the beginning of this week, and 78 of the 117 sheet mills were scheduled for rolling. All Bessemer departments are on the active list.

With exception of six idle tin mills at the plant of the Trumbull Steel Co., all tin plate units in the Valley are active.

This week the Truscon Steel Co. started operations in a new unit completed for the manufacture of its steel joist department.

NON-FERROUS METALS

The Week's Prices

Cents per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
Aug.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
29.....	14.12½	13.50	40.75	6.90	6.70	6.77½	6.42½
30.....	14.12½	13.37½	40.87½	7.00	6.70	6.77½	6.42½
31	14.00	13.50	40.62½	7.00	6.70	6.80	6.45
Sept.							
1.....	14.00	13.50	....	7.00	6.70	6.85	6.50
4.....	14.00	13.50	41.50	7.00	6.70	6.85	6.50

*Refinery Quotation; delivered price ¼c. higher.

New York

NEW YORK, Sept. 4.

The let-up in business, incident to Labor Day, has affected all markets. A fair business has been done in copper at lower prices. The tin market has been strong but quiet. Demand for lead is good and prices are higher. In a quiet market zinc has been steady and a little higher.

Copper.—Sales in the past week are given as close to 2500 tons of electrolytic copper to one company, and this has been the feature of the market. Buying outside of this has been only moderate. Reports that the price during the past week fell below 13.62½c., delivered, is denied. Today the market is stronger because of an advance in London of at least £1 19s. per ton in the last two days. Today some business has been done at 13.75c., delivered, which is regarded as the minimum, with some business reported at 13.87½c. The strength of the London market is not satisfactorily explained, but the effect here is marked. The export market is moderately active and strong. Optimism generally pervades the situation and the opinion is expressed by some that copper has touched the bottom.

Copper Averages.—The average price of Lake copper for the month of August, based upon daily reports in THE IRON AGE, was 14.41c. The average price of electrolytic copper was 14.12c., delivered.

Tin.—Sales of Straits tin on Tuesday, Aug. 28, are reported to have been 300 tons, which, with the heavy sales made on the day before, amounting to about 700 tons, records the most active business for some time. The feature of this buying was the large amount taken by consumers, particularly some large independent tin plate makers. Since then the market has been very quiet, with only small sales reported, and the holidays Saturday and yesterday have tended to slow up all business. The market today has been quiet, with spot Straits tin quoted at 41.50c., New York, the higher price due largely to the stronger market in London, where all metals advanced sharply today. In that market spot standard was quoted at £196 5s., future standard at £198 5s. and spot Straits at £201 5s. per ton. Deliveries into consumption in August were 5510 tons, with 2887 tons reported in stock and landing Aug. 31. The deliveries are considered very good and likely to grow larger as the effect of the shutting down of American electrolytic plants begins to be felt. This is conservatively estimated to involve about 1000 tons a month. Arrivals during the month of August were 6360 tons, and total imports for the eight months of this year are given as 47,662 tons.

Lead.—The market is firm and becoming stronger. Since the advance by the leading interest last week to 6.75c., New York, the New York market has grown stronger until today it is quoted at 6.70c., St. Louis, or 7c., New York. Spot lead is reported scarce and has sold at 7c., Eastern delivery.

Zinc.—So far as quotations go the market is somewhat stronger, due possibly to sentiment and to some foreign inquiry from both England and Italy, the latter being regarded as possibly a war inquiry. Prime Western for early delivery is quoted and has sold at 6.50c., St. Louis, and 6.85c., New York. Most sellers look for better business in the coming weeks.

Nickel.—Quotations for shot and ingot nickel are unchanged at 29c. to 32c. per lb., with electrolytic nickel held at 32c. by the leading producers. In the outside spot market quotations for shot and ingot nickel are 29c. to 32c.

Antimony.—Wholesale lots of Chinese metal for early delivery are quoted at 7.50c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted by importers at 26.50c. to 27c., New York, duty paid, in such cases where they can obtain it from foreign producers. No quotations are reported by the leading producer.

Old Metals.—Quotations on red metals are lower, while white metals are firm. Business is quiet. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	13.50
Copper, heavy and wire	12.50
Copper, light and bottoms	10.50
Heavy machine composition	10.50
Brass, heavy	7.75
Brass, light	6.25
No. 1 red brass or composition turnings	8.75
No. 1 yellow rod brass turnings	7.25
Lead, heavy	6.25
Lead, tea	5.25
Zinc	5.00
Cast aluminum	16.75
Sheet aluminum	16.75

Chicago

Sept. 4.—Tin, lead and zinc have advanced, while copper has declined. Although buying of the three first named metals has been on an improved scale, it has not been as heavy as one would expect in view of the advances. The rise in lead is attributable, in large part, to an advance of one quarter of a cent by the leading producer. Among the old metals there have been no changes outside of a slight decline in zinc. We quote in carload lots, Lake copper, 14.50c.; tin, 42.50c.; lead, 6.75c.; spelter, 6.55c.; antimony, 9c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 11.25c.; copper bottoms, 9.50c.; red brass, 8.50c.; yellow brass, 6c.; lead pipe, 5c.; zinc, 4c.; pewter, No. 1, 20c.; tin foil, 24c.; block tin, 30c.; all buying prices for less than carload lots.

GOLD MARK FAILS TO SATISFY

Prices on Gold Basis Rising Rapidly in Germany —Leipzig Fair a Fizzle—Exports Dwindling

(*By Radiogram*)

BERLIN, GERMANY, Sept. 1.—Heavy demand for iron and steel continues but there is increasing depression in the metal-consuming manufacturing branches, particularly machinery and electrical plants.

Railroad rates and wages last month were put on the gold mark basis, with the result that prices are rising rapidly and already often exceed world market prices. Hence both domestic and foreign buyers have suspended giving orders and there are numerous discharges of workmen.

The Leipzig August Fair, which is a good indicator of business conditions, was extremely dull.

Exports are declining, being only 109,000,000 gold marks in July, against 380,000,000 in June and 680,000,000 in May.

Production in Connellsville Region

UNIONTOWN, PA., Sept. 4.—Prospects of a strike in the anthracite field were reflected during the latter part of the week in increased quotations for coke in the Connellsville region although no material increase in production was recorded. Production in the region for the week ending Aug. 25 was 250,000 tons and that for the week just concluded will average about the same figure. Output for the week of Labor Day will undoubtedly show a little scaling off because of the Labor Day holiday. No change is noted in the coal production or market with the exception of stiffening of inquiries.

BLAST FURNACES STOPPING

Thirty Now Idle in the Pittsburgh and Adjoining Districts

PITTSBURGH, Sept. 3.—There was a net loss of seven active blast furnaces in the Pittsburgh and nearby districts in August, but loss of pig iron production will be greater than is thus indicated by reason of the fact that two furnaces were banked practically all of last month and another made very little iron from Aug. 7 on for the rest of the month owing to an accident to one of the blowing engines. At the end of July the triangle formed by Johnstown, Pa., Wheeling, W. Va., and Warren, Ohio, in which are located 138 furnaces, 115 were making iron, one was banked and 22 were cold. At the end of August 108 were making iron, two were banked, one out of production on account of repairs and 27 were down.

The Carnegie Steel Co. lost one furnace in the Pittsburgh district, but gained in the Shenango Valley and at the end of the month was making iron in 47 of its 59 furnaces. The Pittsburgh Crucible Steel Co. banked one of its furnaces at Midland, Pa., on Aug. 8 and it still is out of production. The stack of the Clinton Iron & Steel Co., Pittsburgh, was blown out Aug. 15. In the Mahoning and Shenango Valley districts two stacks of the Youngstown Sheet & Tube Co. at Hubbard, Ohio, and one Hazelton furnace of the Republic Iron & Steel Co. were blown out, while the stack of the Struthers Furnace Co., Struthers, Ohio, was banked and the furnace of the Sharpsville Furnace Co., Sharpsville, Pa., has been out of production since Aug. 7 as a result of an accident to one of the blowing engines. Against these losses is the blowing in of No. 4 New Castle furnace, Carnegie Steel Co., and the resumption of iron making in No. 3 furnace, Shenango Furnace Co., Sharpsville, Pa., which was banked at the end of July.

Bethlehem Steel Co. put down one of the Johnstown, Pa., furnaces early in August, but there have been no other changes in the western Pennsylvania group of furnaces and the same number of furnaces was active in the Wheeling district at the end of August as one month before.

The record of furnaces in and out as of Aug. 31, in comparison with July 31, is as follows:

Steel Works Blast Furnaces	Total	Aug. 31 In	Aug. 31 Out	July 31 In	July 31 Out
PITTSBURGH DISTRICT					
American Steel & Wire Co	4	4	0	4	0
Carnegie Steel Co	34	29	5	30	4
Jones & Laughlin Steel Corporation	12	11	1	11	1
Pittsburgh Crucible Steel Co	2	*2	0	2	0
Pittsburgh Steel Co	2	2	0	2	0
National Tube Co	4	4	0	4	0
Merchant Furnaces					
Clinton Iron & Steel Co	1	0	1	1	0
Total	59	52	7	54	5
MAHONING AND SHENANGO VALLEYS					
Steel Works Furnaces					
Carnegie Steel Co	15	13	2	12	3
Republic Iron & Steel Co	7	4	3	5	2
Sharon Steel Hoop Co	1	1	0	1	0
Trumbull Cliffs Furnace Co	1	1	0	1	0
Youngstown Sheet & Tube Co	9	6	3	6	1
Merchant Furnaces					
A. M. Byers Co	1	1	0	1	0
Hanna Furnace Co	3	2	1	2	1
Reliance Coke & Furnace Co	2	1	1	1	1
McKeefrey Iron Co	1	1	0	1	0
Sharpsville Furnace Co	1	†1	0	1	0
Shenango Furnace Co	3	2	1	*2	1
Struthers Furnace Co	1	*1	0	1	0
Stewart Furnace Co	1	1	0	1	0
Valley Mould & Iron Corporation	1	0	1	0	1
Total	47	35	12	37	10
WESTERN PENNSYLVANIA					
Steel Works Furnaces					
Cambria Steel Co	11	8	3	9	2
Merchant Furnaces					
American Manganese Mfg. Co	2	1	1	1	1
Kittanning Iron & Steel Mfg. Co	1	0	1	1	0
McKinney Steel Co	3	3	0	3	0
Total	17	12	5	14	3
WHEELING DISTRICT					
Steel Works Furnaces					
Carnegie Steel Co	7	5	2	5	2
National Tube Co	2	2	0	2	0
Wheeling Steel Corporation	5	4	1	4	1
Weirton Steel Co	1	1	0	1	0
Totals	15	12	3	12	3
Grand totals	138	111	27	116	22

*One furnace banked. †Not making iron on account of repairs.

Coke More Active Owing to Anthracite Strike —Statistics as to Supply

WASHINGTON, Sept. 4.—With mining of anthracite coal stopped by the strike and plans made by the Government to provide soft coal and coke as substitutes in hard coal consuming sections, added interest is being shown in stocks of soft coal held by large consumers including industrial plants, railroads and public utilities. While officials in Washington insist that there will be an adequate supply of soft coal and coke to make up the deficiency of anthracite coal for domestic use, and claim that because of large stocks of soft coal on hand, together with production, there will be little, if any, effect on industry from the anthracite strike, the fact remains that even a threat of the anthracite strike developed greater demand for soft coal and coke and brought about higher prices, despite the fact that soft coal production is said to be only 60 per cent of capacity. The movement of soft coal and coke for domestic use under the direction of Federal Fuel Distributor Wadleigh will involve longer rail hauls than are involved when anthracite mines are in production and will call for a greater amount of coal cars. This has raised a question as to whether one of the effects of the strike will be to develop a shortage of this class of rolling stock. Such a shortage would necessarily affect the iron and steel and other industries.

According to a report prepared by the Bureau of Census and the Geological Survey under authority of the Federal Fuel Distributor, commercial consumers had on hand approximately 51,000,000 net tons of soft coal on Aug. 1, an increase of 5,000,000 tons since July 1. At the rate of consumption in July the stocks of Aug. 1 were sufficient to last 44 days on the average, based on the assumption that the stocks were evenly divided, although this is never the case, and the figure, therefore, is given only for general comparisons. Stocks held by steel plants on Aug. 1 represented 35 days' supply, the supply of steam coal being sufficient for 31 days and of gas coal for 42 days. By-product coke plants continued to accumulate stocks during July and the total surplus coke on hand on Aug. 1 was 430,000 tons. This was an increase over the supply on July 1 of 122,000 tons, or nearly 40 per cent. The supply of coal at by-product plants on Aug. 1, was sufficient to last 27 days, and was evenly divided between low and high volatile coal. The report of the Fuel Distributor points out that the importance of consumption is strikingly illustrated by stocks on hand at by-product plants and steel works. The tonnage held at by-product plants on Aug. 1, was 91 per cent larger than on Aug. 1, 1921, and at steel plants it was 27 per cent larger, while the days' supply was 13 and 24 per cent less, respectively. Estimates of railroad fuel stocks based on reports made by the American Railway Association place the total quantity held by the railroads in stock piles, cars and chutes on Aug. 1 at 13,800,000 tons, a supply sufficient for 39 days. In comparison with July 1, this was an increase in days' supply of 39 per cent.

Southern Ohio Pig Iron and Coke Association Meeting

The next meeting of the Southern Ohio Pig Iron and Coke Association will be held at Columbus, Ohio, Sept. 18. The members of the association will be the guests of W. H. Hoagland, president of the Marble Cliff Quarries Co., during their stay in the city, and following a luncheon will be taken on a tour of inspection of the company's plant. Following the visit to the plant, there will be golfing and a dinner at the Country Club. Many important questions will be discussed at the meeting, particularly in respect to the association's activities in the matter of coal requirements of the blast furnaces and coke plants in the district represented by the members.

PERSONAL

S. J. Hammitt, acting manager of the Tokyo office of the United States Steel Products Co., cabled to New York on Monday that the staff in that office escaped safely from earthquake and fire.

A number of changes in personnel of the district sales offices of the Youngstown Sheet & Tube Co., incident to recent absorption of the Steel & Tube Co. of America by that company have been announced by Walter E. Watson, general manager of sales. Edward S. Rooney, who opened the Pittsburgh office of the Youngstown Sheet & Tube Co. in 1906 and since has been in charge of it, will open and have charge of a new district sales office in Cincinnati. His successor in Pittsburgh will be Glenn W. Christopher, now attached to the Chicago district sales office of the company. W. H. Bruce, who has been Southern sales agent of the Steel & Tube Co. of America, will continue in that capacity, with headquarters at New Orleans for the combined companies. B. T. Bechtel, who has been general manager of sales of the Steel & Tube company will continue with the Youngstown company as Chicago district sales manager, with offices in the Conway Building, Chicago, formerly occupied by the Steel & Tube company. F. A. Lathrop, who has been Chicago district sales agent of the Youngstown Sheet & Tube Co., remains in Chicago as assistant district sales manager. Edward S. Rooney, new district sales agent of the company in Cincinnati, has been identified with the Youngstown Sheet & Tube Co. for more than 17 years and with the steel industry in a sales capacity for more than 23 years, having been with the Carnegie Steel Co. in its Cincinnati sales office for about six years before going with the Youngstown company. Mr. Rooney is a native of Cincinnati and in assuming his new post will not only be quite at home but will have the added advantage of more intimate contact with the trade he has cultivated in both of his steel company connections. He has been active in committee work in the Chamber of Commerce of Pittsburgh.

E. S. ROONEY

C. B. Wheeler has been appointed general manager of the Cincinnati Screw Co., Loveland, Ohio, succeeding I. W. Pettingill, who resigned recently to assume the management of the Cincinnati, Milford & Blanchester Traction Co.

E. C. Rebeske, secretary and treasurer Union Drawn Steel Co., Beaver Falls, Pa., has been elected president of the Standard Gauge Steel Co., Beaver Falls, succeeding the late Frederick N. Beegle. Since the same interests control both companies, Mr. Rebeske will continue in his present position with the Union Drawn Steel Co., with which he has been affiliated for 34 years. Herbert A. May, treasurer Standard Gauge Steel Co., has been elected vice-president of the company.

Horace C. Finkle, secretary and treasurer Portland Foundry Co., Portland, Conn., was presented a watch by the employees of the company last week. Mr. Finkle will leave this week for Detroit, where he will represent the W. & B. Douglas Co., Middletown, Conn., pump manufacturers.

Henry J. Bailey, formerly vice-president Consolidated Machine Tool Corporation of America, has been elected president, succeeding the late Waldo H. Marshall. Mr. Bailey started as office boy with Hillis & Jones, Wilmington, Del., 33 years ago and was president at the time of its absorption by the Consolidated Machine Tool Corporation.

Morris Llewellyn Cooke, consulting engineer, Philadelphia, has been appointed by Governor Pinchot director of the so-called Pennsylvania giant power survey authorized by the Pennsylvania legislature and looking to the production of power by large power stations, as at mines, at water falls and at tide water, to secure economies of production, distribution and utilization and stabilization of coal mining operations.

G. D. Harris, founder and general manager U. S. Tractor & Machinery Co., Menasha, Wis., which has been reorganized as the Wisconsin Automotive Corporation, has resigned as general manager and will remain vice-president in charge of the sales department. Adolph F. Reinecke has been appointed general manager.

F. L. Estep of the firm of Perin & Marshall, consulting engineers, New York, returned on Aug. 24 after several months absence in India.

Hugh C. Boyle, who has been in charge of the wire mill of the American Copper Products Co., Elizabeth, N. J., and who recently accepted an offer from the American Insulated Wire Co., Chicago, was tendered a farewell dinner by the staff of the American Copper Products Co. at the Elks' Club, Elizabeth, Thursday evening, Aug. 30. He had been connected with the American Copper Products Co. for about 25 years—almost from the inception of the Waclark Wire Works, its predecessor. Hamilton C. Carpenter presented Mr. Boyle a watch, suitably engraved. Besides Mr. Carpenter, general manager of the American Copper Products Co., Wylie Brown, vice-president and secretary, W. R. Conklin, assistant treasurer, W. F. Heroy, assistant secretary and William J. James, purchasing agent, spoke. Mr. Boyle has left for Chicago to begin at once superintending the erection of a rod and wire mill for the American Insulated Wire Co.

Obituary

CLINTON L. POSTON, Athens, Ohio, one of the oldest and best known coal operators in Ohio, and the last of the pioneer producers of the Hocking field, died at his home Aug. 23, aged 76 years.

CHARLES CROCKER BUSSEY, chemist, Brooklyn, N. Y., died suddenly at the home of his sister, Mrs. Harry Cool, in Canaan, Me., Aug. 29. Mr. Bussey was the inventor of the Bussey process of distillation of fuels. He was born in Newburgh, Me., Jan. 16, 1866. His business experience began with the Walworth Mfg. Co., Boston, where he soon showed marked ability in scientific research. At the age of 24 he entered Massachusetts Institute of Technology, graduating in 1895. Mr. Bussey then entered the foundry business, but subsequently became associated with the Worthington Pump & Machinery Co., Boston, and Rand Drill Co. During the World War he carried on extensive work in Brooklyn under the supervision of the War and Navy Departments.

JOSEPH BAKER, one of the founders of the Baker Stove Works, Belleville, Ill., 35 years ago, died in that city Aug. 29. He was 77 years old and had been blind for two years. Mr. Baker was born in Pennsylvania and as a young man was a moulder. He fought in the Union Army during the Civil War, after which he came to St. Louis. He is survived by one son, George E. Baker, head of the business, and five daughters.

THOMAS A. FURLONG, for many years an electrical engineer on the staff of the Allis-Chalmers Mfg. Co., was killed in an automobile accident at Detroit on Aug. 27. He resided in Milwaukee until a few years ago, when his headquarters were transferred to Chicago.

CHARLES P. RUSSELL, formerly president Wiley & Russell Co., Greenfield, Mass., which is now a part of the Greenfield Tap & Die Corporation, and inventor of the screw plate method of making taps and dies, died at his home in Greenfield, Aug. 27, aged 83.

British Iron and Steel Market

Pig Iron Drops 2½s.—Billets, Rails and Shapes Lower by 5s. to 10s.—Belgium to Roll Rails for Poland—Sheets and Tin Plate Strong

(By Cable)

LONDON, ENGLAND, Sept. 4.

Pig iron continues weak but sales still are limited. Export demand is almost stagnant. Domestic consumers are covering only their urgent requirements.

Foreign ore is idle. Best Bilbao Rubio quotations are nominal. Hematite is firmer on reduced output.

Twelve Northeastern furnaces now are blowing. The total of all Cleveland furnaces operating is 40.

There is improved demand for finished iron and steel, particularly from the Far East for angles, plates and sections.

New shipbuilding contracts are scarce. The Clyde output for August was 9 vessels launched, totaling 1865 tons gross register.

Continental position remains obscure. There is good demand from India and the Far East but the business is not handled here, evidently being transacted by the Continental merchants direct.

It is reported that the stocks of rolled material in the Ruhr total 600,000 tons, with possibly two-thirds of it already sold.

Belgian prices are firmer, billets being quoted at £7 ($31.64) f.o.b., but there are no buyers.

In France coke has advanced 15 fr. to 200 fr. ($11.25). It is reported that the Compagnie des Forges et Acieries de la Marine et d'Homecourt is shortly to start its Saint Marcel plant.

In Belgium the Société Anonyme des Acieries d'Angleur is reported to have secured an important Polish order for steel rails.

Tin plate demand is improving, especially from the Far East. Inquiry is spreading into March. Merchants are sold on January-March at 22½s. ($5.09) basis, IC, f.o.b. There is good business with South America.

Galvanized sheets are quietly steady. The works are well sold to the end of the present month and not disposed to reduce prices on forward contracts.

Black sheets are strong on continued Far East demand. Japanese export houses are buying feverishly, up to £19 15s. (3.99c. per lb.) f.o.b. being paid for cold rolled flat sheets, 30 to 31 gage, 3 x 6 ft., 13 sheets in 107-lb. bundles. The works are asking £20 (4.04c. per lb.) for February shipment. The central selling agency is entitled Oriental Steel Co., Ltd.

We quote per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.52 per £1, as follows:

Durham coke, delivered	£2	1s.	to £2	1½s.	$9.27	to	$9.39
Bilbao Rubio ore†	1	4			5.42		
Cleveland No. 1 foundry	5	5			23.73		
Cleveland No. 3 foundry	4	19	to 5	0	22.39	to	22.60
Cleveland No. 4 foundry	4	15			21.47		
Cleveland No. 4 forge	4	12½			20.91		
Cleveland basic	5	0			22.60		
East Coast mixed	4	18½	to 5	0	22.26	to	22.60
Ferromanganese	18	0			81.36		
Ferromanganese*	18	10			83.62		
Rails, 60 lb. and up	8	0	to 9	0	36.16	to	40.68
Billets	7	10	to 8	5	33.90	to	37.29
Sheet and tin plate bars, Welsh	9	2½			41.25		
Tin plates, base box	1	3⅛	to 1	3¼	5.23	to	5.26
					C. per Lb.		
Ship plates	9	5	to 9	15	1.87	to	1.97
Boiler plates	12	10	to 13	0	2.52	to	2.62
Tees	9	15	to 10	5	1.97	to	2.07
Channels	9	0	to 9	10	1.82	to	1.92
Beams	8	15	to 9	5	1.77	to	1.87
Round bars, ¾ to 3 in.	10	15	to 11	5	2.17	to	2.27
Galvanized sheets, 24 g.	18	10	to 18	15	3.73	to	3.78
Black sheets, 24 gage	13	15			2.77		
Black sheets, Japanese specifications	15	5			3.08		
Steel hoops	12	0	& 12	10*	2.42	&	2.52*
Cold rolled steel strip, 20 gage	17	5			3.48		
Cotton ties, Indian specifications	15	0			3.03		

*Export price. †Ex-ship, Tees, nominal.

Continental Prices, All F. O. B. Channel Ports, Delivery as Specified

Foundry pig iron:					
Belgium	£5	5s.		$23.73	
France	5	5		23.73	
Luxemburg	5	5		23.73	
Billets:					
Belgium	7	0		31.64	
France	7	0		31.64	
Merchant bars:				C. per Lb.	
Belgium	8	0	to £8 5s.	1.62	to 1.67
Luxemburg	7	17½	to 8 5	1.59	to 1.67
France	7	10		1.51	
Joists (beams):					
Belgium	7	12½		1.54	
Luxemburg	7	12½		1.54	
France	7	10	to 7 12½	1.51	to 1.54
Angles:					
Belgium	8	0	to 8 5	1.62	to 1.67
⅛-in. plates:					
Belgium	8	15	to 9 0	1.77	to 1.82
Germany	8	10		1.72	
5/16-in. plates:					
Luxemburg	7	15		1.56	
Belgium	7	10		1.51	

Sheet Sales to Far East Extend Into January—Germany Buyer of Shapes and Plates

LONDON, ENGLAND, Aug. 23.—Conditions in the iron and steel markets do not as yet show much sign of improvement. Business has been interfered with in the first place by the holidays in Scotland, at the beginning of the month, and now by those in force on the Northeast coast. Moreover, this time of the year is always a slack one. The political situation on the Continent naturally has a bad effect upon business, consumers the world over being disinclined to enter into any substantial commitments until there is a sign of price stabilization. In some quarters it is thought that if the Ruhr chaos were cleared up, prices in this country would come down with a run. On the other hand, makers maintain that even selling at today's figures leaves little or no margin of profit.

The supplies of pig iron have been enhanced somewhat by the closing of works, and in consequence prices have a decidedly easier tendency, No. 3 Cleveland being at about 101s. 6d. and East Coast mixed numbers at about 98s. to 99s.

In finished iron and steel there has been a steady demand from the Continent, particularly Germany, for heavy plates and sections, and some good business has been done. The demand for lighter material, however, continues strong, the Far East being a good buyer of thin black sheets, in fact, to such an extent that nearly all the works here have sold their output for the rest of the year, and some of them for shipment as far ahead as January. In this connection a note of interest is that a central selling agency is being established, which will handle the whole of the output of the thin black sheets made by the Welsh makers.

That there is a tendency toward amalgamations is still prominent, the latest being that of the Grovesend Steel & Tin Plate Co., which has just acquired the Dyffryn, Mardy, and Dynevor tin plate works, which now gives the Grovesend possession of 54 tin plate mills and 22 sheet mills, while the output of the steel works controlled by the company will amount to between 300,000 to 400,000 tons a year.

Stockholders of the Wheeling Steel Corporation, Wheeling, W. Va., at a recent meeting authorized a closed bond issue of $75,000,000 against all the properties of the corporation. Bonds of this issue to the amount of $10,000,000 will be available for the redemption of $8,000,000 3-year secured 6 per cent gold notes issued June 21, 1923. These notes were sold under terms permitting their conversion at any time at the option of the holder into Wheeling Steel Corporation, first and refunding mortgage 5½ per cent gold bonds series "A" due July 1, 1948 at 98 per cent, with an adjustment of interest.

Position of Tin Plate Makers Explained

(*Continued from page* 603)

metrical control, and many other features inaugurated, all in the interest of general improvement. Notwithstanding this we are as yet unable to uniformly distribute the coating over the surface of the plate or to maintain any fixed tin yield on any of the equipment. The variation in weight of coating increases considerably as the size of the plate increases and as the weight of coating is made heavier. Each tin house unit, or pot, has a capacity of say from 40 to 100 base boxes per turn of eight hours, and it is apparent that large numbers of such units are necessary to coat the product. This, of itself, is a detrimental factor in maintaining uniformity, as the personal element must always to a considerable extent enter into the operation of each unit as well as the features of temperature, mechanical equipment, etc.

Classifying the Product

"Following the coating operation the product is cleaned and assorted, and classified as 'primes,' 'seconds,' 'menders' and 'waste waste.' Prime and second sheets are shipped properly identified to the purchaser. Menders are returned to the department for re-treatment, and waste waste consigned substantially to scrap and sold as such. Seconds are so classified on account of irregularities discernible in the assorting operation and are made up of small uncoated spots, turned down corners, irregular shearing, ragged edges, blisters, etc. It should be borne in mind that large areas of such plates are not affected by the irregularities above referred to, and such sections are of 'prime' quality.

"The tin plate manufacturer does not presume to determine the gage or weight of plate to be used for any particular can or size of can, accepting the gage specification of the can makers without question and having no detailed information as to the manner in which the plate is to be used. Unfavorable comment has been made from time to time on the variation in the weight of tin plate, and it is, therefore, not a new subject, having been considered from time to time. In fact, we may say it has been continuously considered since the manufacture of tin plate was first undertaken in this country.

An Impossible Proposition

"It has never been the practice in this or any other country, so far as we can learn, to assort tin plate for weight, the product being generally acceptable to the trade as produced. It is practically impossible, both from a physical standpoint as well as from that of cost, to institute such a practice. If mechanical appliances were available (and they are not) to mechanically assort for weight, rejecting each individual sheet outside of a fixed permissible variation of, say, 2.5 per cent, there would be rejected at this point from 30 to 40 per cent of the product, this rejection being divided between heavy and light plate; and there would consequently be at least three, and probably more, distinct gage classifications for every gage, size and different weight of coating produced. The multiplicity of sizes the tin plate makers are called upon to produce, varying in dimension by as little as ⅛-in., together with other physical impossibilities, renders favorable consideration of this feature out of the question at producing plants.

"Material rejected in assorting would be practically unsalable and it would mean that the manufacturer would be called upon to produce 130 per cent to 140 per cent of product on every specification entered; 30 per cent to 40 per cent of which would be unsuitable for the purpose intended and much of it for no purpose whatever. The position of the tin plate manufacturers, therefore, must be that any or all material required more accurate to weight than is possible under the present manufacturing methods must be assorted by the consumer, and the present practice of selling tin plate as produced be maintained.

Present Plan Favored

"Any chemical specification which might be adopted or physical tests outlined to determine quality can be of no value unless it is possible for the consumer to check and determine whether material as specified is being received; and the manner in which such tests are taken and the quantity of material they represent are of the utmost importance and consequence. Lack of ductility or failure to respond to manufacturing operations might result from the use of an entire heat of improperly made steel.

"This steel reaches the tin plate maker in units of approximately six to eight tons of Bessemer and 50 to 80 tons of open-hearth. In the course of manufacture this steel cannot be identified, so that the quantity to be accepted or rejected by such tests as it might be possible for the customer to make would not only be important, but it will be readily seen cannot safeguard the customer, and might seriously penalize the manufacturer. Again, failures might be the result of improper annealing, which operation is carried on in units of probably less than five tons, and no doubt considerably less than this quantity would be affected.

"Variation in weight of coating is in evidence not only on the output of each individual tinning stack, but the product of each pot will vary from time to time and constantly during the entire operating period; and this, so far as is known to the art today, is uncontrollable.

"The above is not intended to be in detail, but presents the matter in a manner which will clearly indicate the impossibility of checking up specifications with reasonable fairness to all concerned.

Questions as to Tests

"It would be difficult to determine to what extent tests should be made and what quantity each test should represent. To undertake the analysis of a sheet from each box would be an enormous undertaking, and even then would not insure that the material accepted or rejected was or was not within the specification. In determining the amount of coating carried on the plate and if it conforms to the specifications, we asume this can be done only by chemical method, which would disclose little or nothing beyond the amount of tin contained in or on the sheet analyzed. This would mean to the manufacturer substantially a spot test, or, in other words, to insure acceptance of his product and to bring the areas of lighter coating within the specification, he would of necessity be forced to adopt the practice of coating the entire product so heavily that minimum points would come within the specification. This would mean the consumption of a very excessive amount of tin of no value whatever to the customer and would represent serious economic loss. It would probably mean increasing the amount of tin now used for material to the canning trade of from ¾ to 1-lb. per base box. We might calculate the cost of this additional amount of tin at a fixed price per lb., and we could calculate the cost of other features in our operation as a result of this change in practice. We cannot, however, even attempt to estimate the influence the additional consumption of pig tin would have on the tin market. This market is a very sensitive one and closely controlled abroad, subject to serious and excessive fluctuations. During the late war, pig tin reached a price of $1.10 per lb.; under normal conditions it has reached 65c. per lb., and it is safe to assume that any substantial increase in the quantity consumed in this country would immediately sky-rocket the price of tin probably to a point not as yet dreamed of."

Cooperation between the professional engineers of both Czechoslovakia and Poland and the Federated American Engineering Societies is being established, according to the president of the federation, Dean Mortimer E. Cooley. Dr. Bedrich Stepanek, who recently resigned as minister of Czechoslovakia to the United States, will spend six months in this country studying industrial, agricultural and social conditions, principally in the South and West.

Herbert Hoover has been elected to honorary membership in the Czechoslovak Engineers and Architects Association, the honor being conferred at the annual conference of the association held recently at Kosice.

The "Stainless" Metals of Commerce

(*Continued from page* 615)

with the greatest trepidation on the writer's part that the lines immediately following are written, since to the metallurgist they must appear so elementary. They are written in the hope that this short treatise may appeal to some who do not describe themselves as metallurgists.

Plain carbon steel in its physical make-up has been aptly likened by a celebrated chemist to an igneous rock. The carbon it contains combines chemically with a definite atomic proportion of iron, and the chemical compound so formed alloys itself with more "free" iron, the particles of the alloy thus formed being interspersed more or less regularly through any remaining "structurally" free iron. It will be readily apparent that at a certain limiting proportion of carbon there can be no structurally free iron left, the whole of the steel mass being composed of the alloy pearlite. At such a point, which in plain carbon steel is reached at 0.89 per cent carbon content, the steel is described as a "saturated" one. Below this point we should call it "subsaturated," and above it "supersaturated," for in the last named the compound of iron and carbon begins to make its appearance as a separate entity.

On subjecting the steel to a temperature only in the order of half that required to melt it, the pearlite alloy becomes dissociated, and the chemically compounded carbide of iron passes into solid solution in the uncombined iron. If we cool the heat-soaked mass slowly, the carbide of iron once more separates out; if on the other hand we abstract the heat very quickly from it, we retain the solid solution—as an intensely hard and brittle mass which we call martensite. But on the incorporation of certain metals with steel in sufficient quantity profound changes are brought about in these respects. The percentage of carbon with regard to the point of saturation is materially altered, and concurrently the chemical and physical properties of the main mass may be altered completely.

Effect of Nickel Additions

Let us take as an example the case of the addition of nickel to a subsaturated steel. Up to a certain point progressive increments of nickel strengthen and toughen the steel, which retains its pearlitic character. On reaching this point—whose location depends very largely on the original carbon content of the steel—further increments of nickel render the steel intensely hard automatically. As a matter of fact, without the intervention of any heating and rapid cooling it becomes naturally martensitic.

There is, however, a limitation of the hardening and embrittling effects of the nickel additions, the point of limitation being again determined mainly by the percentage of carbon in the steel. And beyond this point the metal changes its character again as the result of the addition of still more nickel, becomes soft, pliable, and malleable, has a homogeneous microstructure, and possesses new physical characteristics as to electrical resistivity, reaction to chemicals, magnetic properties, and measures of contraction and expansion. In effect, we have attained another base, complex instead of simple, and differing entirely from our original base in its chemical and physical properties, though iron is the major constituent of it.

Austenitic Iron Alloys

Reverting to generalities, the natures of complex iron-containing bases will naturally differ radically in properties according to their secondary metallic components. As a class they may be described as "austenitic" or "polyhedral" iron alloys, though they are not all simple "austenites." Many contain free carbides also and consequently can be hardened on suitably heating and quenching. It should be pointed out, also, that their mechanical distortion in some cases brings about transformation, and consequent "throw-back" in properties.

It is significant that the revolutionary ferrous advances of the last dozen years lie in the domain of complexes such as have been described generally, and it is the considered opinion of the writer that in the development and modification of those complexes—whether already known or to be discovered—our chief future advances in ferrous metallurgy will be made.

"Manganese" steel was the forerunner, "nickel valve" steel was the immediate successor, "high-speed" steel followed, and subsequently came "stainless" steel, far and away the most epoch-making of them all. The high-speed steel of 20 years ago was little more than the plain complex or iron and tungsten. The "super" high-speed steels of today are examples of the development of that complex. Is it not logical to regard that member of the "stainless" series most familiar to us today, viz., "stainless" cutlery steel, as one example of partial development of the iron-chrome complex, in the further development of which complex great strides can be made? It cannot be too insistently enunciated that the word "stainless" as applied to steel is a descriptive name covering a wide series and not merely one particular type. Too often is the name associated only with cutlery steel, because this happens to be the type of the series which is most familiar to us.

Proper Heat Treatment Essential

It must next be realized that stainlessness in steel, even in the restricted sense hereinbefore defined, is the result of development by physical means of an inherent property; in other words, "stainless" steels must not merely be suitably compounded, but suitably heat treated also, in order to get maximum results. Broadly it may be said that the more its chrome-cementite is retained in solid solution in the polyhedral chrome-iron alloy the better will be its stainless properties. But the passing of chrome-cementite into solid solution is slow, and needs a high heat; wherefore hardening must be carried out at temperatures very considerably above those incident to the treatment of plain carbon pearlitic steels. As compensation, however, the solid solution is much more stable in comparison, hence subsequent tempering can be carried out at correspondingly higher temperatures. Since one of the most important functions of tempering is to release hardening strains, and since release of those strains is much more efficiently performed as temperature rises, this attribute is very valuable.

"Stainlessness" at Varying Temperatures

A brief description of some emperical tests in demonstration may be of interest. The "stainless" steel used was somewhat lower in chromium and somewhat higher in carbon contents than the variant used for cutlery; therefore temperatures must be regarded comparatively rather than literally. Five sample pieces of it were quenched respectively at 950, 1000, 1050, 1120 and 1200 deg. C. After quenching, the microscope showed that the first quenched piece contained a fair amount of free carbide; the second less; the third only traces; while the fourth and fifth contained none. The action of vinegar on them showed a very decided stain on the first, less staining on the second, barely traceable staining on the third, and complete non-attack of the fourth and fifth. Subsequent tempering of the pieces, repolishing them after each tempering treatment, showed tempering up to 550 deg. C. to cause no visible modifications of power of resistance to vinegar attack, while tempering at 600 deg. C. lessened resistance to staining in each case. Samples of "stainless" cutlery steel were next correctly hardened, as checked by the microscope, and respectively tempered at 500, 550, 600 and 700 deg. The first showed no diminution of resistance to staining; the second decided diminution of resistance; the third, very marked, and the fourth still more marked diminution.

The pioneer work in connection with chromium "stainless steels" will always be associated with the name of that gifted practical scientist, Harry Brearley. Their development is being ably carried on by many workers, of outstanding prominence among whom is Dr. W. H. Hatfield. His monumental work on stainless steels—as also on the corrosion of metals generally—must enshrine his name permanently in metallurgical history.

A brief review of the non-ferrous and "Borderland" stainless metals may not be without interest. Since stainless steel had its first exposition with regard to table cutlery, it is reasonable to suppose that non-ferrous articles of table furnishings would be the first to receive attention. And this has been so. But here two fresh considerations must come into play. First, in contradistinction to knife blade manufacture, the majority of the work on them—especially in the later stages—has to be done cold, and for carrying it out very expensive tools are necessary. The stainless non-ferrous alloy, therefore, must be very amenable, otherwise the increased cost due to restriction of output and destruction of tools would prove prohibitive. Second, the question of color comes into play. It may be said that this is merely an aesthetic consideration. But the nature of demand creates the nature of supply, so that the point of color becomes a very commercial one.

Nickel-Chrome and Nickel-Copper

Of all the stainless metals of commerce none are, or, in the writer's judgment, can be equal in power of corrosion resistance to metals of the nickel-chromium series. But, as far as our present knowledge of them extends, they must be ruthlessly ruled out of the category of commercial stainless metals, whose exponents are consumed almost entirely in the fabrications of articles of table furnishing or of ornamental function. Nickel-chromium alloys are very stubborn in their cold working, and enormously destructive to fine tools. As to color, the fact has to be faced that any alloy of which nickel forms the preponderating component shows lack of the desirable silvery whiteness. Where, however, nickel represents less than half the make-up—in some cases very considerably less—the silvery white luster is attainable.

Monel metal, which typically may be described as an alloy containing 70 per cent of nickel and 30 per cent of copper, and which has corrosion resisting qualities of a high order, is thus also sequestered from present consideration, on the question of its color, which is unfortunate, since the metal is quite reasonably amenable mechanically.

German or Nickel Silver

Articles of table furnishings or of somewhat allied description are almost invariably made from one of the series of alloys known generally as German, or nickel, silver. They may de described as containing a proportion in the order of three-fifths of copper, one-fifth (or less) of nickel, and one-fifth (or more) of zinc. The article fabricated from it is usually plated by the electro-deposition on its surface of a protective and ornamental simple metal. Some of the nickel-silvers, high in nickel content, are polished as they stand, with appearance results quite satisfactory. Regrettably, such metal articles—whether plated or unplated—stain, corrode, tarnish and discolor badly in their legitimate use. The principle of composition of most of the so-called "stainless nickels" on the market may be broadly described as modifications of the present nickel silver to the extent of cutting out the zinc, at the same time greatly increasing the nickel proportion, and incorporating with the alloy a small quantity of some other constituent, such as tin or phosphorus.

The Nickel-Cobalt-Chrome Series

New trade variants are constantly being presented to us, but details of their composition and manufacture are secretively guarded. The advisability of the use of cobalt as an additive metal in reasonable proportion is strongly indicated from our present knowledge. The writer is firmly of the impression that, provided prices be not prohibitive, the best of the non-ferrous stainless alloys will be found in the nickel-cobalt-chrome series. Such alloys, naturally, will always be comparatively expensive.

It is no idle dream that in the fairly near future developments will take place in the ferrous stainless alloys which will result in their power amply to fill those requirements which at present can be met only by the non-ferrous stainless metals.

Reference should be made to the progress that is being made with one of the expensive metals most familiar to us, namely silver. Here the experimenter is severely limited, for by law an article of silver which legally can be described as such must contain at least 92.5 per cent of silver. While the subject of non-corrosive silver, or stainless silver, has not been tackled with finality, great progress has been made in a modified direction. One of silver's worst enemies is tarnish, the visible result of action brought about by atmospheric, though not oxidizing, influences. There has been placed upon the market lately (and the facilities for its production are practically unrestricted) a sterling silver, legally acceptable, and indistinguishable as to its appearance and behavior from the ordinary silver known to us, which even under intensive conditions does not tarnish or lose its color as to its unprotected polished surface.

In fine, we may now be said to have entered upon an era of "stainless" metals. In that era the predominant rôles will be played by the nickel complexes and by the iron complexes, and chromium will prove one of the most helpful allies. There remains much to be accomplished, but the movement is well under way. Even silver has awakened from its Rip Van Winkle sleep of centuries.

NEW TRADE PUBLICATIONS

Charging Equipment for Vehicle Motive Power Batteries.—General Electric Co., Schenectady, N. Y. A 12-page folder, bulletin 43976, illustrating and describing equipment as designated in the heading, and including not only the motor generator sets, but switchboards of all capacity and semi-portable sets.

Riveters.—Hanna Engineering Works, 1765 Elston Avenue, Chicago. A 64-page catalog of pneumatic and hydraulic riveters of large and small capacity and great variety of form and design. Air hoists and trolleys for supporting riveters or other weights are also featured. The catalog makes a point of providing easy ordering of spare parts by the use of diagrams, names of parts, weights and code words. The largest riveter shown has a reach of 21 ft. and exerts 100 tons pressure. Other types with smaller reach go as high as 150 tons pressure.

Expanded Lath.—General Fireproofing Co., Youngstown, Ohio. A 16-page pamphlet devoted to solid partitions based on metal lath and with particular reference to saving space by the thinness of the partitions, and to making them sound-proof. Detailed drawings are given, showing construction arrangements.

Bare and Insulated Wire and Cables.—American Insulated Wire & Cable Co., Chicago. A flexible cover booklet of 128 pages, measuring 3½ x 6 in., and devoted to descriptive matter covering weatherproof and bare copper wire, concentric and rope lay strand copper cable, galvanized steel strand, bare iron and steel wire and other material. Nearly half the book is devoted to tabular matter concentrated on the subjects most applicable to the wire using industries, including wire tables, metric units, pole line data, copper statistics and other cognate matter.

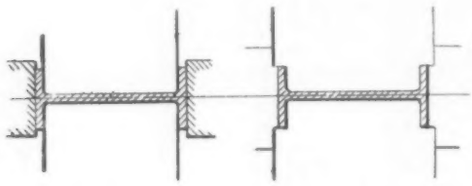
Electro-Plating and Buffing Apparatus.—A. P. Munning & Co., Matawan, N. J. Not only is this 276-page book a catalog of apparatus and supplies for all industries doing electro-plating and buffing, but it also is a compendium of useful information to those engaged in this class of work. It contains chemical and electrical information of distinct value to electro-platers. It lists and briefly describes 229 chemicals used in various electro-plating industries, and gives a reference list of scientific articles and bulletins of the Bureau of Standards covering specific portions of the literature of the industry. An index at the back makes it easy to find information desired, while the illustrations, both half-tone and line-cut, are numerous.

Induction Motors.—Reliance Electric & Engineering Co., Cleveland. Bulletin No. 5018 descriptive of type AA induction motors for two and three-phase alternating current circuits. Illustrations are numerous and include sectional and exploded views. A table of ratings and general outline dimensions are given. Salient features of design are discussed.

Rolling Broad-Flanged Beams

(*Continued from page* 616)

passages through one and the same pass, the flanges are full at the end, while at the center they vary. The result is a variation in the dimensions of the flanges, which causes much trouble during subsequent rolling. This trouble is overcome in the suggested arrangement by the constant flattening out in the shaping pass of the blooming mill.



Main Stand First Stand

Fig. 3—Finishing Mill

In the suggested arrangement the bloom is rolled end-on a number of times at the very beginning, until the requisite width of flange is attained. Hence the flanges are thickened at the outset. This is necessary because, when the bloom goes through the shaping pass, the flanges are subject to very slight pressure as compared with the web. The result is that the formation of fins on the web is enhanced the more the latter is compressed. This, however, contravenes the second principle of establishing, as early as possible, the ratio of cross-sections between flange and web of the finished beam and maintaining this ratio throughout the rolling.

With two pairs of vertical rolls it is possible, by suitably adjusting the distance apart of the rolls, to exert a constant horizontal pressure on the flange. This pressure need not be so great as in the special mill. It is even desirable in the blooming mill to apply stronger pressure for a time to the web than to the flanges, as the ingot is not so dense inside as on the outside, and because the lack of density in the inside can be remedied by the heavier pressure applied to the web, the bloom being at this moment still at welding heat. It would be sufficient in the case of beams 40 in. deep to make the width of the bloom 64 in., or at most 68 in., and to reduce this down to 56 in. at the final pass. It is sufficient, then, if the vertical rolls can be adjusted within 8 in. on either side.

The H-shaped bloom is then passed from the blooming mill to the special mill. The rolling can be finished in a single mill of this kind with one or two stands. At Differdingen, however, an intermediate mill, also with four rolls in the same plane, has been installed, which is an improvement owing to the fact that the material to be rolled is distributed over three plants and hence output is increased. Further, the rough-rolled material leaves the blooming mill with a thicker web and flanges, and the final ratio of cross-sectional areas between flange and web is reached at an earlier stage in the rolling.

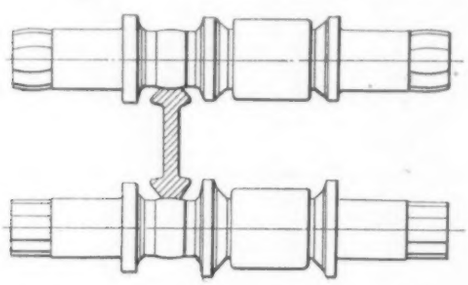


Fig. 4—Blooming Rolls for 40-In. Beams

This intermediate mill at Differdingen has been more generously dimensioned than the finishing mill, from the correct standpoint that the pre-rolled section must be rolled here as quickly as possible, if the beam is to be finished with the metal at a reasonably high temperature. The intermediate mill at Differdingen, however, is not designed on lines similar to the finishing mill, but has only one stand. It is therefore necessary to limit the width of the flange in this intermediate stand. This arrangement would not be desirable in any proposed new plant; the intermediate mill should be arranged just like the finishing mill, but the diameter of the rolls should be increased, as has been done at Differdingen.

There are two important reasons in favor of this proposal. Since the whole of the work of rolling in the intermediate mill is carried out on one stand, it has been found necessary to chamfer the edges of the flange, as shown in Fig. 1, with a view to preventing the formation of burrs in the intermediate mill. The advocates of this idea maintain that this chamfering in the blooming mill has its special advantages, the material of the flange being squeezed toward the junction between flange and web, and therefore preventing the formation of hollows.

This opinion, however, is based on a false conclusion.

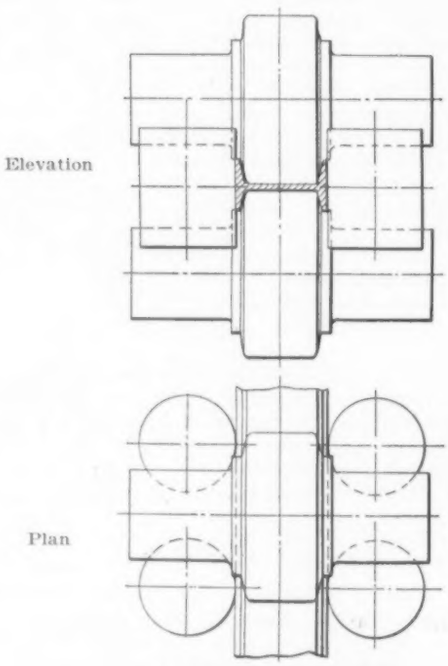


Fig. 5 — Blooming Stand with Vertical Cylindrical Rolls

A glance at Fig. 1 will show that the material forced from the edges of the flanges does not get to the junction between web and flanges. The edge of the flange is finished long before the web attains its final thickness. Moreover, it is obvious that the rolled-down material flows toward the ends of the flanges, because the bloom is partly not shaped at all and partly only very roughly shaped. Should the material not be sufficiently ductile, there is a danger of the edges of the flange becoming cracked—a serious drawback.

This chamfering is even more risky in the intermediate mill (Fig. 2). In this case the whole principle of correct rolling goes by the board. Owing to the blooming roll being chamfered, it is impossible to get a shape in which the correct ratio between the sectional areas of the web and flange is established. On scrutinizing the first pass in the intermediate mill (Fig. 2), it will be seen at once that, due to the chamfering or beveling, the flange has much too small a cross-section compared with that of the web. This must necessarily lead to the formation of a fin on the web, and set up internal stresses in the rolled product. This fact alone condemns any chamfering or beveling. Further, the material of the flange, due to the lower pressure, is not properly worked, and instead of strengthening the junction between flange and web, the material escapes through the free passage left between the vertical and the horizontal rolls.

If the intermediate mill is designed in the same way as the finishing mill, but stronger, all broad-

flanged girders over 24 in. deep should be finished on the intermediate mill. In this way it is possible to apply greater pressure and so finish the product with the minimum loss of heat. For sections from 5½ to 24 in. deep, it is desirable, in view of high production, to distribute the work over three stands. In the case of heavier sections, where two 10-ton or 12-ton blooms are always in course of being rolled, the diameter of the rolls in the intermediate mill should be 56 in., while 48 in. to 50 in. should be sufficient for the rolls of the finishing mill. This assumes that the maximum width of flange does not exceed 16 in.

The position of the intermediate mill relative to the blooming mill will naturally depend on the available site and space. If there is sufficient room, the intermediate mill should be laid down in a line with the blooming mill, but there is no great objection to installing the two mills side by side. As regards the finishing mill, it is well for this to be at the same level as the intermediate mill.

It will generally be necessary to crop the bloom, probably at both ends, on leaving the blooming mill. For this purpose large hydraulic shears with specially shaped blades are not recommended. Large saws on sledges and running at a high speed, and with large centrifugal masses, are more suitable.

As regards the finishing mill (and the remarks will apply to the intermediate mill also, if it is designed on the same principle), for new mills cylindrical vertical rolls are preferable to double-conical rolls (Fig. 6). One of the advantages of the former type is that the bottom roll and the vertical rolls do not require to be adjusted vertically, but only the top roll. With double-conical rolls it is necessary either to adjust both horizontal rolls in a vertical direction, while the vertical rolls are not moved in a direction perpendicular to the former, or the bottom roll can be made a fixture, the vertical rolls and the top roll being arranged so as to be adjustable vertically in the fixed ratio of 1 to 2. Mill workers do not care for adjusting the bottom roll. The only alternative course is to make the vertical rolls adjustable in both directions and to displace them vertically in the ratio of 1 : 2 relatively to the top roll. This is difficult, because of the unequal wear due to the unequal pressure borne by the bearings of the top roll and the vertical roll.

All these difficulties are avoided by using cylindrical vertical rolls. They have the further advantage of needing support only at the bottom and are quite free at the top. They butt against two smooth rolls which take up the whole of the horizontal pressure (Fig. 7). By this arrangement the correct rolling of the beam is controlled automatically.

Assuming that the vertical rolls are not truly perpendicular to the flange, but too tight at the bottom; the vertical roll in that case would bear hard on the ball bearing and cause overheating. If, on the other hand, they were too tight at the top, then the roll, due to want of support, would be lifted up. The attendant would therefore have only to watch that the vertical rolls are running smoothly to be sure that the section was being rolled with the flange at a true right-angle to the web.

Wear of the rolls is a very troublesome feature in the rolling of beams with broad flanges without taper. In this particular the special rolling mill is in a different position from the ordinary rolling mill, where wear is of considerably more importance. As an example, let us take a roll which was set once or twice for rolling 12-in. broad-flanged beams. The rolls were then turned down and the mill used for beams of 11.6 in., and after being run once or twice, the rolls were further turned down and the mill used for rolling beams 11.2 in. deep.

This process can be continued until the diameter of the roll becomes so small as to make it impossible to adjust the vertical rolls. This, of course, occurs at an earlier stage than the possibility of turning down the roll for the next smaller section. The same remarks apply to the larger sections, in which case it is found possible to dress the roll four or five times in normal production before being obliged, due to wear of the sides, to turn down the roll to the next lower section.

The smallest section hitherto rolled in these special mills is a beam 140 mm. (5½ in.) deep. But there is no reason why broad-flanged beams 120 or even 100 mm. deep (4¾ in. or 4 in.) should not be so rolled.

In conclusion, it is essential to get a straight run for the finished beam. For this purpose the Differdingen Works have already fitted guide rolls behind the finishing rolls. Such guide rolls should be used not only behind the rolls, but also in front of them, and not only in the finishing mill but in the intermediate mill.

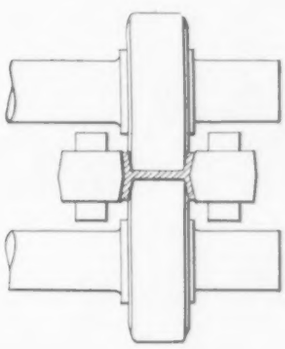


Fig. 6 — Mill for Rolling Beams; with Double-Conical Vertical Rolls

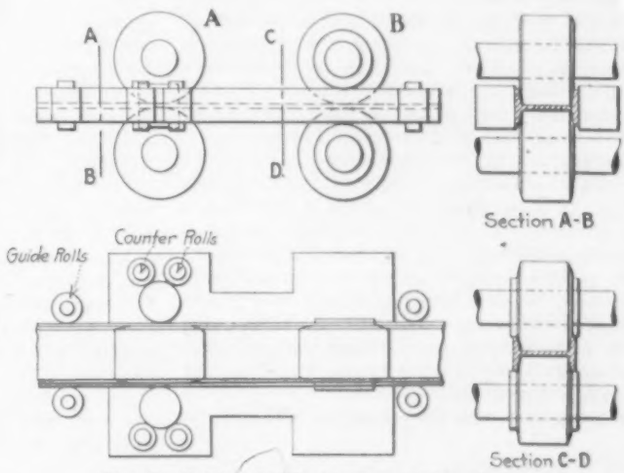


Fig. 7—Rolling Mill with Two Pairs of Stands

The Struthers Furnace Co., operating a merchant stack at Struthers in Mahoning county, has banked the furnace owing to stagnation in the pig iron market. Just prior to closing, the stack had been pouring on foundry iron, but previously had been producing basic for steel makers' requirements. There is piled in the furnace yard a sufficient stock of iron to care for customers for some time. By the time of exhaustion of these stocks, it is expected conditions will have so shaped themselves that the furnace will either resume or will be blown out. It has operated since early in the year, except for a period of idleness in mid-summer for repairs. Suspension of this unit, and resumption of a stack of the Shenango Furnace Co., gives the district 32 active furnaces, of 46.

Machinery, steel and equipment of the Century Steel Co., Poughkeepsie, N. Y., comprising a complete crucible steel plant, will be sold at public auction on the premises, Sept. 14, starting at 11 a. m., by the Industrial Plants Corporation, 25 Church Street, New York.

President Coolidge's Position on the Tariff

White House Believes Business Should Not Be Unnecessarily Disturbed—Increase Proposed on Pig Iron and Decrease on Magnesite Under Flexible Provision of Law

BY L. W. MOFFETT

WASHINGTON, Sept. 4.—The White House statement last week that President Coolidge will exercise great caution in changing import duties under authority of the flexible provisions of the Fordney-McCumber tariff act has had the effect of confirming the general view that the President would go slow in making use of this new departure in tariff making. While some adhere to the opinion that the statement credited to the President was equivalent to a decision to make no changes at all in tariff rates under the flexible provisions, this is held to be an extravagant and unwarranted interpretation of the position of the President. A few sought to support this view by claims that Mr. Coolidge, in contrast to the late President Harding, who sponsored the flexible provisions, is decidedly cold, if not actually hostile, to them. But, it is pointed out, this opinion is not justified. Further discussion of the subject by the President showed that what he had in mind was that business needs assurances of stability and confidence and knowledge that the country is to go ahead without any great changes. The President was said to feel that stability in tariff duties is an important influence. At the same time, the President was declared to hold the opinion that, if the Tariff Commission makes the report showing a wide variation in figures upon which rates in the tariff were based by Congress, he should make use of the powers given him and change the duties, but only in clearly defined cases where the need for changes is apparent.

Question as to Constitutionality

It is well recognized by the Administration that the flexible provisions sooner or later will be the object of attack in court as to their constitutionality and it seems altogether likely that these provisions will have to be passed on and their status determined by the Supreme Court of the United States. The principal attack made against the provisions from a point of law is that Congress, charged by the constitution with the duty of raising revenues, has no power to delegate to the President the right to change tariff rates which obviously affect revenues. Several means of preventing the application of changed rates are reported to be in contemplation, but so far these reports have not been verified. Among the reports was one that injunction proceedings might be sought. The object of the injunction has been variously mentioned as the Tariff Commission, which has authority to recommend new rates; the President, who has authority to order them put into effect, and the Treasury Department, which through its customs officers would collect revenue under the new rates. There are other provisions in the tariff which are also likely to be the object of legal attack, including the retaliatory clause, which its opponents claim violates commercial treaties between the United States and "most-favored" nations. Attack on any new tariff law of course is nothing new; it is the usual thing. The chief interest in the present attack relates to the flexible provisions because the latter represent a new form of tariff regulation for the United States.

The construction placed upon the legality of the flexible provision necessarily affects the business interests of the country. So far, only three investigations under the flexible provision of interest to the iron and steel and related trades have been ordered by the Tariff Commission. One relates to pig iron, the second to files, and the third to magnesite and magnesite brick. The domestic end of the pig iron and file investigations has been completed and authorization from the commission is being awaited to begin the investigations abroad. The magnesite investigation was ordered recently.

Appeal of Eastern Companies

Application for the pig iron investigation was made by the tariff committee of Eastern pig iron manufacturers representing producers of pig iron and the Eastern seaboard section of the United States and representing 23 blast furnaces. The committee consists of Robert C. Lea, chairman, secretary and treasurer Robesonia Iron Co., Ltd.; Richard Peters, Jr., former manager of sales Pulaski Iron Co., now with the Robesonia Iron Co., and John W. Logan, secretary Alan Wood Iron & Steel Co.

The companies represented by the committee are the E. & G. Brooke Iron Co., Central Iron & Steel Co., Colonial Iron Co., Delaware River Steel Co., Eastern Steel Co., Pulaski Iron Co., Replogle Steel Co., Reading Iron Co., The Robesonia Iron Co., Ltd., Thomas Iron Co., Witherbee, Sherman & Co., Alan Wood Iron & Steel Co.

The pig iron application was filed with the Tariff Commission last December. An examination of it shows that not only is the charge made that pig iron from Europe was being sold in the United States at less than the cost of production in this country, but in some cases, it was said, there was reason for believing that English pig iron was being sold in the United States at prices less than cost of production in the country of origin, which would come under the anti-dumping act.

The petition of the American pig iron interests in part says:

"It is urged upon your honorable commission that in considering our application for an investigation it should be borne in mind that the situation of blast furnaces east of the Alleghenies in relation to the competition of foreign iron is very different from that of inland furnaces whose markets are protected to a very large if not an entire degree by freight rates from ports of entry to inland points, and therefore that statistics having to do with the American pig iron industry as a whole do not necessarily apply to that part of the industry which is located in the Eastern seaboard section. Thus it will be found at the present time that there is a greater degree of activity among inland furnaces than among those located in the East. Despite the fact that the present is a time of relatively large activity in the iron and steel markets, there are in the Eastern section modern well-equipped furnaces which are unable to operate through inability to compete with the foreign pig iron."

Recent Competition

"During recent months pig iron from England and the European Continent has been available and has been bought in large quantities in the markets served by the blast furnaces which this committee represents at prices which were and are not only much lower than the prices of domestic pig iron, but also in many instances lower than the cost of producing pig iron at the furnaces which this committee represents, which constitute the majority of the merchant furnaces and some of the steel works furnaces in the Eastern seaboard section. There is also some reason for believing, particularly with reference to certain tonnages of English pig iron which have been and are being imported, that some of this foreign iron has been sold at prices less than its cost of production in the country of origin, thus perhaps coming under the anti-dumping clauses of the existing tariff law. However, at the present

stage of its investigation of these matters, this committee is not prepared to prove this particular item of its allegations, but merely offers the same as a reasonable surmise based upon general information.

"The disparity between the prices of foreign and domestic iron has recently been lessened by a sharp decline in the price of domestic iron brought about very largely by the competition of the foreign material. It remains the fact, however, that both British—and to a greater degree, Continental iron—can be obtained at prices below present or any probable future costs of production of domestic iron.

"It is the unanimous belief of the companies represented by this committee that the pig iron industry of the eastern seaboard is seriously threatened by the competition of foreign pig iron, and relief under Section No. 315 of the tariff act is most earnestly sought at as early a date as may be possible."

Proposed Reduction on Magnesite

The application for investigation in the magnesite situation seeks maximum reduction on magnesite by 50 per cent. The application was filed by Special Representative John Joseph Ernster, Boulevard de Holbrich, Luxembourg, for the following foreign producers: Austro-American Magnesite Co., Steirische Magnesit Industrie, Magnesitwerke Eichberg-Aue Gesellschaft. The magnesite petition to a large extent renews arguments which were made during the tariff hearings. It is maintained that before the war about 90 per cent of the United States requirements of magnesite were furnished by works in the former Austro-Hungarian monarchy and that it was the "main endeavor of the Austro-Hungarian industry to displace from the market substitutes for magnesite consisting principally of dolomite and chrome, which were at all times used in the United States. They succeeded to a large extent, as the United States steel industry, after using magnesite, was soon convinced of its superior qualities. Though chrome and dolomite were cheaper than magnesite, they were, therefore, largely displaced owing to their inferior quality and shorter durability."

The petition maintains that quality of domestic magnesite which was stimulated when the Austrian sources were cut off by reason of the war did not "reach up to that of Austrian magnesite." At some length the petition sets forth the arguments made in connection with the tariff on magnesite, attacks a domestic producer of magnesite for the import rates asked and says the tariff finally passed with a duty of $11.50 per net ton of calcined magnesite and $15 plus 10 per cent per ton of magnesite bricks. The petition goes so far as to state that the Western producers of magnesite had stopped production since Jan. 1, 1921, "not because they were unable to compete but chiefly for the purpose of demonstration, and they have not to date resumed work, even after imposition of the tariff, presumably in order to show the impossibility of competing successfully with their products on the Eastern market owing to the high freight, the reduction of which they are striving for."

Claims of Foreign Producers

After attacking statements of domestic producers as to selling prices of Austrian magnesite, the petition continues:

"The first effect of the new tariff was that prices for magnesite rose by about the height of the tariff. Before the tariff was passed, the average price of calcined magnesite in America was $29 to $30 per ton, and $50 to $55 per ton of magnesite bricks, whereas after the introduction of the tariff calcined magnesite sold at $40 to $43 per ton and magnesite bricks at $70 to $75 per ton. The price of bricks was recently reduced to $65 per ton.

"Of course, the industries using magnesite are much affected and the tariff does them considerable damage. They are now compelled either to pay for magnesite the increased price due to tariff or they have to go back to the use of cheaper and inferior substitutes such as chrome and dolomite they had discarded before the war as being of poor quality. According to numerous reports, American steel manufacturers seem to have decided to use these cheaper substitutes, chiefly chrome ore and chrome bricks, which are still free from import duty. Chrome ore sells at present at $16 to $18 per short ton c. i. f. Philadelphia or Baltimore, chrome bricks at $50 per short ton f. o. b. American port. Chrome is found in the United States in relatively small quantities and is mainly imported from Greece and New Caledonia. It is much more used now because the high tariff has come into force. This is also proved by the fact that before introduction of the tariff chrome was used for refractory purposes only, the quantity being about a tenth that of magnesite.

"The fact that chrome is more used shows that American magnesite works themselves have suffered from the new tariff and the consequent increase of magnesite prices, sales having much decreased, owing to the revival of substitutes. Naturally, Austrian magnesite works suffer in a still higher degree from conditions caused by the tariff which practically prohibit the shipment of Austrian magnesite to America. The importance of the effect tariff had on Austrian magnesite works can be judged from the fact that previously the average export to America was 60 to 70 per cent of the entire Austrian magnesite output. The Austrian magnesite works employ about 6000 workmen, and American capital to the extent of about $3,000,000 is invested in the Austro-American Magnesite Co., Radenthein."

BRITISH FOREIGN TRADE

July Steel Exports the Smallest This Year—Imports Show Little Change

A sharp decline in British iron and steel exports was registered in July. The total, including scrap (6852 tons) was 314,522 gross tons, or the lowest this year and the smallest since September, 1922. The July exports were nearly 120,000 tons less than in May. Imports in July were 128,486 tons or close to the average for the first half, comparative data for both exports and imports, scrap being included, were as follows:

British Steel Exports and Imports, Gross Tons

	Exports	Imports
Aver. per month, first quarter, 1923	358,208	128,032
April, 1923	398,507	133,929
May, 1923	435,630	114,132
June, 1923	373,277	130,066
Aver. per month, second quarter, 1923	402,471	126,042
July, 1923	314,522	128,486
Average per month, 1922	295,980	82,215
Average per month, 1921	144,885	152,734
Average per month, 1920	274,881	128,685
Average per month, 1919	188,519	50,801
Average per month, 1913	420,757	195,264

More detailed data of the exports are as follows:

Principal British Exports, Gross Tons per Month

			July	
	1913	1922	1922	1923
Pig iron }	93,700	66,159	{ 27,675	26,938
Ferroalloys }			{ 23,058	16,512
Steel rails	42,200	21,300	6,955	24,473
Steel plates	14,200	7,400	8,438	13,800
Galvanized sheets	63,500	43,600	27,739	40,527
Steel bars rods, etc	20,900	19,100	20,221	29,646
Tin plates	41,200	37,400	40,809	39,993
Black plates and sheets	11,700	18,700	18,785	29,808

Data as to importations of importance are as follows in tons per month:

	1913	1922	Jan.-July 1923
Iron ore	820,000	289,400	541,255
Manganese ore	50,100	28,100	39,910
Pig iron and ferroalloys	18,000	12,800	11,325

Exports of scrap iron and steel in July were 6852 tons, or 10,464 tons per month for the first seven months of this year, as compared with 12,880 tons per month in 1922. In 1913 there were 9600 tons per month.

The Youngstown Sheet & Tube Co., Youngstown, has declared a quarterly dividend of $1.25 per share on common stock, and $1.75 on preferred, both payable Oct. 1 to stock of record Sept. 15. Disbursement of this common dividend will make a total of $3.50 per common share paid this year.

Russia Slowly Improving in Iron and Steel

Production Increases as Communistic Methods Are Abandoned—Ural District Sells to Manchuria—New Currency Gradually Replacing Paper Rubles

BERLIN, GERMANY, Aug. 16.—In spite of an occasional relapse, Russia's iron and steel industries continue their slow recovery. The recovery is quite evidently associated with the decrease in communistic control, particularly as it is manifest in the growth of semi-independent trusts, the leasing to private interests of former nationalized undertakings, the restoration of transport and banking, and the spread of the new gold-secured currency in "tchervonetz" units, each equal to ten gold rubles. On July 1, 13,500,000 "tchervontsi" were in circulation against 200,000 on Dec. 1, 1922. The "tchervonetz," being fully secured according to the law of July, 1922, has maintained its exchange value, while the paper rubles which also circulate continue to depreciate. Part of the wages in some of the metal working plants are now paid in "tchervontsi." The state banks' present aim is to accumulate sufficient high-exchange currencies by export of grain and oil to provide security for a much larger "tchervonetz" circulation, so that the paper ruble will be gradually displaced and finally repudiated.

Acute Fuel Shortage

The fuel shortage is still acute. Coal production in all Soviet Russia increased from 30,500,000 puds in Sept., 1922, to 60,100,000 puds in December, after which the improvement was interrupted, production in January declining to 50,700,000 puds increasing in February to 61,400,000 puds, and declining again in March to 55,400,000 puds. These figures are gross. For April, May and June only net production, after supply of immediate needs was reported. The net figures are: April, 32,824,000; May, 43,837,000, and June, 50,500,000 puds. The last figure, being net, makes a new high record. The official *Izvestiya* reports that in June for the first time the coal output and the number of miners working reached 100 per cent of the official program. The Don basin's gross coal production in the first half (October, 1922, to March, 1923) of the current business year is officially put at 253,000,000 puds. The electrification of the whole Don mining district has been undertaken.

Iron Ore Output Still Very Low

The iron ore production is stated to be increasing. The Southern ore trust (Yuzhno-Rudni) reports an output of 1,050,000 puds in April; 1,532,000 puds May; 1,660,000 puds June, and (estimated) 1,580,000 puds for July. The iron ore production of all Russia in 1922 increased from 996,000 puds in January to 1,722,000 puds in December. The official program for 1923 was 3,250,000 puds per month, but this, it seems, will not be realized. In spite of the improvement, ore production is still a mere fraction of the pre-war production, when one leading group of mines, the Krivoi Rog, produced 90,000,000 puds a year. The export trust, however, complains that native Russian industry cannot consume the ore output, hence the export to Germany in the first eleven months of 1922 of 4,400,000 puds. This export has ceased with the general collapse of German ore imports as a result of the Ruhr situation.

Increasing Make of Pig Iron

The Soviet press reports a pig-iron famine. Commissary Bogdanoff lately rendered a report stating that the old reserves of pig iron had been used up, and that the new output of the blast furnaces is insufficient to meet even the very moderate domestic demand. The production program of the Southern furnaces for the first half of the current business year was 6,250,000 puds. The pig iron production of all Russia, according to a revised report of the Moscow Financial-Economical Bureau, was:

	Puds	Gross Tons
October, 1922	1,010,000	16,263
November, 1922	1,217,000	19,596
December, 1922	1,324,000	21,319
January, 1923	1,723,000	27,749
February, 1923	1,548,000	24,927
March, 1923	1,876,000	30,208
April, 1923	1,555,000	25,039
May, 1923	1,680,000	27,052

The latest figures for open-hearth steel production show 2,861,000 puds for March, of which 1,154,000 puds came from the Urals; April, 2,809,000 puds, of which 1,270,000 puds was produced in the Urals; May, 2,905,000 puds, of which 1,308,000 puds was from the Urals. Of rolled materials March figures show 2,548,000 puds; April, 2,319,000 puds; May, 2,450,000 puds and June, 2,656,000 puds.

Iron and Steel Deliveries to Asia

Despite the domestic shortage, the Urals have resumed delivery of iron and steel to northern Manchuria. The chief buyer, it is stated, is the Chinese Eastern Railroad. A Soviet law of July 17 restores to private individuals the right to prospect for metals, and gives them a preferential right in exploiting their discoveries. Concerning Russia's electrical industries it is reported that on June 1, 26 works were operating, employing 14,083 men. The output of electrical machines and apparatus in the first ten months of 1922 exceeded that of the same months of 1921 by 108 per cent.

Community Effort in the Location of New Industries

R. R. Shuman, for a number of years president of the Shuman-Haws Advertising Co., delivered an address before the Chamber of Commerce and other organizations of Appleton, Wis., on "Industry Finding," indicating the lines on which the efforts of civic organizations should be directed in the establishment of new industries. The classes of industries which it should be the aim to locate are described as follows:

1. More industries such as now succeed in the locality.
2. Industries producing equipment and supplies bought in large quantities by present industries.
3. Industries using products already produced in the town—converting plants.
4. Agricultural industries.
5. Industries producing commodities sold in large quantities by local jobbing houses.
6. Branch plants.
7. Industries using raw materials found locally.
8. Industries to take up excess in any kind of labor.
9. In the case of Appleton especially, industries in which low power cost is an important factor in production.

The address also points out what forms of promotion work may be best undertaken:

1. Make a scientific survey of industrial conditions as they are, uncolored by local pride or prejudice.
2. Determine upon the ten types or classes of industries which you most need and can best support.
3. Prepare a specific brief for each of these ten classes of prospects and mail a copy of it to all the well-rated Eastern and Central West firms in those industries.
4. Tell your specific story in the form of a double page or a colored insert in the trade magazines in each of these ten classes—a different story for each class—and offer to send a copy of a brief to responsible inquiries in each class.
5. Prepare a general industrial brief and do some general industrial advertising, enumerating your general advantages as well as your specific needs.
6. Advertise to industrial workers through national magazines and local newspapers, telling the human side of your community.
7. Foster cooperative promotion, inspection, pack, advertising and marketing of local farm products.

Machinery Markets and News of the Works

INQUIRIES MORE NUMEROUS

Automotive and Railroad Buying Looked for —Few Large Lists

American Steel & Wire Co. and Westinghouse Air Brake Co. Inquire for Several Tools

Improvement in inquiry has been noted in several centers, and prospects for business are considered better than a month ago. However no large lists have been issued, requests for prices being for the most part for one to three machines, actual sales being largely for single items also.

At least two manufacturers in the automotive field are expected to place orders in the near future, and resumption of railroad buying is looked for after the first of October.

The Ford Motor Co. is understood to have placed orders for considerable equipment during the past two weeks, and has other inquiries pending. Business from other Detroit automobile companies is in prospect. In Milwaukee the automotive industries appeared as the main source of inquiry.

New business that has developed includes a list of 27 machine tools issued by a textile interest for a new Southern mill.

Inquiries involving considerable equipment have come out from the American Steel & Wire Co., for its Trenton plant, and from the Westinghouse Air Brake Co., Pittsburgh. Gray & Davis, Inc., Boston, has purchased engine lathes, shapers and sensitive drills and are contemplating further purchases.

Railroad buying included drilling machinery taken by the Norfolk & Western. Purchases were also made by the Central Railroad of New Jersey, Seaboard Air Line, and the Elgin, Joliet & Eastern Railroad.

Interest in used tools centered largely in the auction sale at the Victory Plant, Squantam, Mass. At least 100,000 varities of equipment were offered, machine tools bringing good prices, and better, it is said, than anticipated.

New York

NEW YORK, Sept. 4.

THE market is extremely quiet, both industrial and railroad inquiries being at a low ebb. Some railroad business is reported placed and a fair degree of activity is noted in used tools. The Central Railroad of New Jersey has closed on its list, the purchase including one locomotive axle journal turning lathe, a car-wheel borer and a punch and shear from one builder, and two large turret lathes from another. Another fair-sized list recently closed was that of the Seaboard Air Line, which bought a 3000-cu. ft. air compressor and one of smaller capacity, a 36-in. punch and shear and a 60-in. punch and shear, two vertical wheel presses, three flue-welding machines and some woodworking machinery. The Elgin, Joliet & Eastern Railway has purchased a list including a 30-in. planer, an axle lathe, a car-wheel lathe and a 44-in. boring mill. Gray & Davis, Inc., Boston, Mass., who are reported to have closed on the recent inquiry for 5 engine lathes, 4 shapers and several small sensitive drills, are said to be contemplating further purchases. Sing Sing Prison has purchased a 50-ton hydraulic press. The Southern Railway is said to have received bids on two large turret lathes.

Property on 139th Street, near the Southern Boulevard, New York, 75 x 100 ft., has been acquired by the Multi Metal Co., 251 West Nineteenth Street, manufacturer of wire and screen cloth, etc., as a site for a new plant, for which plans will soon be prepared.

Work is in progress on a new ice-manufacturing and cold storage plant at 513-23 West Fortieth Street, New York, for the Ice Service Co., 68 Ninth Avenue, to be equipped for an initial output of 300 tons per day, and storage capacity of 4000 tons, estimated to cost $1,000,000, including machinery. James S. Maher, 431 West Fourteenth Street, is architect.

The Pavan Garage Co., 104 East 126th Street, New York, is planning for the installation of a lathe and other tools in its machine shop.

The Middle States Oil Co., 383 Madison Avenue, New York, has acquired a controlling interest in the Maar Oil Co., with plant at Eldorado, Ark. Plans are under advisement for extensions and improvements in the present plant, including the installation of additional equipment for larger capacity.

A machine shop, with lathe, drill press, cylinder grinder and other equipment will be installed in the five-story automobile service building, 100 x 100 ft., to be erected at 117 West Eighty-ninth Street by a new corporation, now being organized and whose name will be announced at an early date. It will cost about $500,000, with equipment. Louis Brooks, 17 East Forty-fifth Street, is architect in charge.

The Empire City Iron Works, Tenth Street, Long Island City, has awarded a general contract to the Gillies Campbell Co., 101 Park Avenue, New York, for the erection of a new two-story addition at Tenth Street and East Avenue. Leopold Heffner is president.

The Harlem Metal Corporation, 502 East 133rd Street, New York, is planning for the installation of additional metal-working tools and equipment.

The Martin-Parry Corporation, 61 Broadway, New York, manufacturer of commercial automobile bodies, with main plant at York, Pa., has leased a portion of the building of the Standard Steel Car Co., William Street and Ely Avenue, Long Island City, totaling 27,000 sq. ft., for a new branch plant.

Samuel S. Glauber, Inc., 242 East Seventy-ninth Street, New York, manufacturer of pipe, plumbing equipment, etc., will commence the construction of a new two-story works 100 x 135 ft., at 521-29 East Seventy-ninth Street, to cost about $170,000, for which a general contract recently was awarded to the Turner Construction Co., 244 Madison Avenue.

Plans are being perfected by the Department of Plant and Structures, Municipal Building, New York, Grover A. Whalen, commissioner, for the erection of a large central machine and repair shop, with parts manufacturing department, for automobiles and trucks used by the fire, police, street-cleaning and other city departments. An appropriation of $3,500,000 has been granted for the building and machinery. It will be located at Avenue C and Sixteenth Street and is expected to be ready for service within six to nine months.

Bids will be received until Sept. 10, by the Transit Commission, 49 Lafayette Street, New York, for the construction of an addition to the repair and equipment shops of the Interborough Rapid Transit Co., Lenox Avenue and 148th Street. The City Engineering Department, Municipal Building, is engineer.

The Western Electric Co., 195 Broadway, New York, has plans for the construction of a power plant at Kearny, N. J., to cost in excess of $150,000, with machinery, to be used in connection with its proposed new electric instrument works at this location, to cost more than $5,000,000, complete.

A machine shop with lathe, drill press and other tools, will be installed in the four-story automobile service building, 100 x200 ft., to be erected in the vicinity of Mt. Edan Avenue, estimated to cost $85,000. It will be owned and operated by H. A. Hoffman, care of H. A. Koelble, 114 East Twenty-eighth Street, New York.

The Crane Market

FROM the standpoint of new inquiries the market has been quiet the past week, but there is still a fair volume of pending business and a number of good inquiries seem to be expected from projects now under construction. Among current inquiries is one from Henry L. Doherty & Co., 60 Wall Street, New York for a 100-ton overhead traveling crane. Other inquiries still pending are two 10-ton cranes for the General Electric Co., Schenectady, N. Y., a 15-ton gantry crane for the Phoenix Utility Co., 71 Broadway, New York, a 15-ton overhead traveling crane for the General Engineering & Management Corporation, 165 Broadway, New York, the 25-ton overhead crane for the Brooklyn Edison Co., Brooklyn, N. Y., a used 5-ton electric traveling crane for the Worthington Pump & Machinery Co. for its Blake & Knowles plant, Cambridge, Mass., three 20-ton locomotive cranes for the American Telephone & Telegraph Co., New York, a 20-ton crane, for export, to Viele, Blackwell & Buck.

Among recent purchases are:

Foundation Co., 120 Liberty Street, New York, a 20-ton locomotive crane from the Brown Hoisting Machinery Co.

Viele, Blackwell & Buck, 49 Wall Street, New York, a 20-ton locomotive crane from the Browning Co.

S. A. Dunn & Sons, Rensselaer, N. Y., a 7-ton crawl tread locomotive crane with ¾ cu. yd. bucket from the Orton & Steinbrenner Co.

Brown Paper Mill Co., West Monroe, La., through H. S. Ferguson, consulting engineer, 200 Fifth Avenue, New York, a 12-ton, 46-ft. span, 5-motor overhead traveling crane with two 6-ton trolleys from the Chesapeake Iron Works and a 15-ton, 52-ft. 4-in. span, 5-ton, 13-ft. 3-in. span, 8-ton, 51-ft. 10-in. span and 8-ton, 53-ft. 4-in. span, hand power cranes from the Reading Chain & Block Corporation.

Florida Machine Works, Jacksonville, Fla., a 5-ton, 40-ft. span single 1-beam crane from the Shepard Electric Crane & Hoist Co.

In the Pittsburgh district, inquiries lately have come out for several cranes. The Pennsylvania Railroad, Central Region, is asking bids on one 3-ton, 3-motor, 46-ft. span crane for its Olean, N. Y. shops. The Gulf Refining Co., Pittsburgh, has an inquiry out for two 15-ton, 3-motor, 45-ft. span cranes for its Port Authur, Tex., refinery. The Pennsylvania Casting & Machine Co., Pittsburgh, N. S., is in the market for a 3-ton, 3-motor 37-ft. span, floor operated crane.

The Westinghouse Electric & Mfg. Co., has placed two 10-ton, 5-ton auxiliary cranes, 47 ft. 2½ in. span, for its Essington, Pa., plant, with Alliance Machine Co.

The Hooven-Owens-Rentschler Co., Hamilton, Ohio, has placed a 3-ton, 2-motor cab operated monorail hoist with the Milwaukee Electric Crane & Mfg. Co.

A. O. Smith Corporation, Milwaukee, Wis., two 5-ton monorail trolleys to Shaw Crane Co.

The Continental Can Co., 61 Broadway, New York, has employed Francisco & Jacobus, 511 Fifth Avenue, consulting engineers, to prepare plans for the proposed addition to its plant at Fifteenth and Sixteenth Streets, Jersey City, N. J., to be five stories and basement, 200 x 200 ft., estimated to cost $500,000, including machinery.

Manual training equipment will be installed in the proposed three-story high school to be erected on Curtis Street, Linden, N. J., estimated to cost $300,000, for which plans are being drawn by H. B. Brady, 333 North Broad Street, Elizabeth, N. J., architect.

New England

BOSTON, Sept. 3.

BUYING during the past week has been confined for the most part to single items, although a notable exception was the purchase of three plain and two universal milling machines and a small lathe by a Cambridge, Mass., maker of automobile accessories. Other sales of milling machines, both new and used, have been made to textile mills and companies identified with that industry. In other tools, a 36-in. lathe taken by a textile mill, and a squaring shear capable of cutting material 11 ft. long, bought by a Lynn, Mass., manufacturer, gear cutting machinery, which went to a Bridgewater, Mass., company and several sensitive drills mostly to local manufacturers, are noted.

In new business a list of some 27 machine tools required by a textile mill for a new Southern plant, is conspicuous. A majority of these tools, however, are specified, and consequently there probably will be little competition for the business. With the exception of an advance of about 15 per cent in one line of gear-head lathes, which brings it in line with other makes, prices for machine tools remain unchanged. Aside from an inquiry for a 30-ton unit wanted by a Rhode Island utility company, the crane market here displays little life.

Interest in used tools has centered largely in the auction sale at the Victory Plant, Squantum, Quincy, Mass. This plant was built during the war for the Fore River Works, Bethlehem Shipbuilding Co., Ltd., and covers 730 acres. It is proposed to dispose of practically all the equipment there, the few remaining units to be used in building aircraft. During the past week's sale there were at least 100,000 varieties of equipment offered. One of the largest prices obtained was $41,500 for a power plant. A 12-in. boring mill brought $3,000. Other machine tools brought good prices and better, it is said, than anticipated. A quantity of miscellaneous material will be auctioned off Sept. 18.

The town of Middleboro, Mass. has postponed indefinitely the erection of a power house and other civic improvements.

Permit has been granted the New England Fuel & Transportation Co., 111 Devonshire Street, Boston, to erect a one-story coke crushing plant at Everett, Mass.

Bids closed Sept. 5 for a 28 x 56 ft. boiler house contemplated by the H. B. Smith Co., Westfield, Mass.

The Cumberland Power & Light Co., Portland, Me., plans to erect a power station, the location to be decided later. G. E. Haggas, Congress Street, that city, is the engineer.

No date has been set for the closing of bids on the proposed repair shop for the East Providence, R. I., works of the Union Tank Car Co., 21 East Fortieth Street, New York. The company is taking bids for a one-story, 90 x 150 ft. mill.

Permission has been granted to receivers of Bateman & Companies, Inc., Grenloch, N. J., to sell at public auction the Massachusetts properties of the company. These properties are the Richardson Mfg. Co., Worcester, Mass., and Belcher & Taylor Co., Chicopee Falls, agricultural tools and implements.

Work is in progress on a three-story machine shop and general manufacturing works, 51 x 220 ft., at the plant of the Judson L. Thomson Mfg. Co., South Street, Roberts Station, Waltham, Mass., manufacturer of rivet-setting machines, tubular rivets, etc., to cost about $100,000, with machinery, for which a general contract recently was awarded to the W. H. Whitcomb Construction Co., 6 Beacon Street, Boston.

Manual training equipment will be installed in the proposed new high school to be erected at Cape Elizabeth, Me., estimated to cost $100,000. The Board of Education is in charge.

Basil & Hutchins, Tremont and Camden Streets, Boston, are planning for the installation of a machine and repair shop in their proposed new automobile service building to cost about $55,000, including a lathe, bolt-threading machine, hack saw, drill press and other tools.

The new Method Die Co., 100 Sudbury Street, Boston, is planning for the installation of a motor-driven air compressor, mechanical suction fan, and kindred equipment.

The Norma Co. of America, Inc., Anable Avenue, Long Island City, N. Y., manufacturer of ball bearings, etc., has asked bids on a general contract for the erection of the first unit of its proposed new plant on property recently acquired at Glenbrook, near Stamford, Conn., to be one-story, 100 x 400 ft. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects.

Manual training equipment will be installed in the new high school to be erected on North Main Street, Middleboro, Mass., estimated to cost $110,000. Edward I. Wilson, 109 State Street, Boston, is architect.

Manual training equipment will be installed in the two-story high school to be erected at Gorham, N. H., estimated to cost $110,000, for which bids are being taken on a general contract. William Potter, 22 East Seventeenth Street, New York, is architect.

Baltimore

BALTIMORE, Sept. 3.

ERECTION will soon commence on a one-story addition to the plant of the Lobdell Car Wheel Co., Christiana Avenue, Wilmington, Del., manufacturer of railroad car wheels, for which plans have been completed.

Bids will be received by the Chief of Air Service, United States Army, Washington, D. C., until Sept. 18, for 250 standard engine control assemblies, and 200 fuel oil pumps, circular 24-20. Also, until Sept. 17, for 250 Nelson gun control operating cable and bracket units, and 250 gun thrust rod assemblies, circular 24-17. Until Sept. 11, for 500 wheel assemblies, 36 x 8, circular 24-14; and until Sept. 10, for 250 single pole, double throw toggle switches, 250 single pole double throw switch guard plates, and 250 flush tumbler switches and plates, circular Q.R. 2418.

The Consolidated Gas & Electric Co., Lexington Building, Baltimore, has plans for the erection of a one-story machine and repair shop, 118 x 170 ft., at Constitution and Monument Streets, estimated to cost $70,000.

Bids will be received on a general contract until Sept. 12, for the erection of the proposed three-story boys' high school at Macon, Ga., estimated to cost $400,000. A machine and mechanical shop, 23 x 122 ft., one-story, will be built adjoining the main structure. A list of machinery to be installed will soon be arranged. Curran R. Ellis, Mason, and G. Lloyd Preacher, Augusta, Ga., are associated architects.

The Virginian Railway Co., Norfolk, Va., has plans in preparation for the construction of a new electric generating plant on the New River, with initial capacity of 90,000 hp., to be used in connection with the electrification of its line from Roanoke, Va. to Mullins, W. Va., 213 miles, for which latter work plans are being consummated. A number of branch power houses and steel tower transmission system will also be built. The entire project will involve approximately $15,000,000.

Price Brothers, Inc., Church and Second Streets, Frederick, Md., has inquiries out for a six-spindle drill, new or second-hand in good condition; also, for one punch press, for handling material 4 in. in diameter and $\frac{7}{8}$-in. thick.

H. T. Holt, 717 Hull Street, Richmond, Va., operating an automobile service works, is planning for the installation of a lathe, drill press and other equipment.

A machine shop, with lathe, cylinder grinder and other equipment will be installed in the three-story automobile service building, 60 x 115 ft., to be erected at Greenville, S. C., by C. O. Allen, estimated to cost $75,000, for which a general contract has been let to Potter & Shackelford, Inc., Greenville. J. E. Sirrine & Co., Inc., Greenville, is engineer.

The National Gold Arsenic Corporation, Room 2001, 25 West Forty-third Street, New York, plans for the construction of a power house in connection with a new plant on site to be selected in Georgia, estimated to cost $200,000, with machinery. L. P. Jubien is secretary.

The Wilson-Hock Co., City Point, Va., machinery dealer, has inquiries out for a flywheel, 20 ft. in diameter, 12 in. face, and 14 in. bore, for use on a Corliss engine; also, for a centrifugal pump, 400 to 600 gal. per minute capacity, operating against an 80 ft. head, motor or belt-driven, second-hand in good condition; five 3-phase, 60 cycle, 2200-volt electric motors, four of which to be suitable for direct connection, and one with starting equipment; three outdoor type transformers, each 500 kva. capacity; several 60 cycle transformers, about 37½ to 50 kva. capacity, each.

C. M. Wall & Son, Lexington, N. C., have inquiries out for a Corliss engine, 300 to 375 hp., left-hand, operating at 110 to 120 lb. steam pressure, and auxiliary equipment.

Fulton & Barnes, 1643 West Broad Street, Richmond, Va., operating an automobile repair works, plan for the installation of a drill press and other equipment.

Frederick Noble, Cedartown, Ga., operating a plant for the manufacture of paper boxes and containers, is perfecting plans for the establishment of a new plant at Rome, Ga., where production will be concentrated. The present works will be removed to the new location and additional machinery installed.

The Virginia Truck Body Co., 19 South Linden Street, Richmond, Va., is in the market for a drag scraper, complete with ½-yd. capacity iron scoop, chains, etc., for 300 ft. travel.

The Chicago Nipple Mfg. Co., 1966 Southport Avenue, Chicago, manufacturer of nipples and other engineering products, has acquired a building on First Street, Baltimore, adjoining its local branch plant, and will install equipment at an early date for increased output. This represents the third expansion in the Baltimore works since established a number of months ago.

The General Purchasing Officer, Panama Canal, Washington, will take bids until Sept. 20, for electric hoists, chains, electric motors, drills, wrenches, valves, and kindred mechanical equipment for canal zone service, circular 1555.

Morton Jones & Co., Inc., Ashville, N. C., recently reorganized, is perfecting plans for the establishment of a new local plant for the manufacture of hot-air heating furnaces and parts, to consist of a foundry, machine shop and assembling works, to cost in excess of $55,000, including equipment. Morton Jones is president.

A. R. Hall, 1623 West Broad Street, Richmond, Va., operating an automobile service works, plans for the installation of a shaper and other equipment in the machine department.

The Shenandoah Caverns, Inc., Woodstock, Va., H. B. Chapman, head, has inquiries out for stone-cutting and polishing machinery, with power equipment for operations.

Philadelphia

PHILADELPHIA, Sept. 3.

THE American Ice Co., 633-35 North Eden Street, Philadelphia, will commence the erection of an addition to its plant, 56 x 100 ft., to cost approximately $50,000, for which plans recently have been completed by C. Leslie Weir, architect.

The Dodge Steel Works, State Road and Hellerman Streets, Philadelphia, plans for the early installation of equipment in the addition to their foundry, estimated to cost $25,000, for which a general contract was awarded recently to the Austin Co., Bulletin Building.

The Trenton Flint & Spar Co., Marian Street, Trenton, N. J., operating a grinding and finishing plant, has awarded a general contract to Bainford & Turner, Trenton, for the erection of a one-story addition.

The John A. Roebling's Sons Co., 612 South Broad Street, Trenton, N. J., will build a new one-story power house at its wire and cable works, Clinton Avenue, to be 42 x 100 ft.

The Victor Talking Machine Co., Camden, N. J., is perfecting plans for the installation of machinery in its new addition now under way, estimated to cost $1,000,000, with equipment.

The American Briquet Co., Land Title Building, Philadelphia, plans for the construction of a power house at its proposed plant at Lykens, Pa., for the manufacture of fuel briquets, estimated to cost $750,000, including machinery. A. D. Parker, Philadelphia address, is in charge.

The York Mfg. Co., York, Pa., manufacturer of ice and refrigerating machinery, has acquired a tract of land totaling about 80 acres in the southern section of the city, for $75,000, for extensions. Plans are under consideration for the erection of a large foundry for the production of gray iron castings, to cost more than $150,000, with pattern shop adjoining. Other buildings will be constructed later.

The Allentown Fence Works, Third and Chew Streets, Allentown, Pa., manufacturer of wire fencing, is installing additional equipment for increased production, including a punching and shearing machine, air compressor and other machinery. Practically all equipment in the future will be electrically-operated and motors installed for this purpose. Tilghman Reuber heads the company.

Manual training equipment will be installed in the proposed high school to be erected at Mauch Chunk, Pa., estimated to cost $100,000, for which it is expected to select an architect to prepare plans at an early date. The Board of Education is in charge.

The Pennsylvania Railroad Co., Broad Street Station, Philadelphia, is planning for the erection of additional buildings in connection with its new steel car repair shops at the Enola, Pa., yards, now under way, for which it is proposed to break ground in September.

Manual training equipment will be installed in the two-story senior and junior high school to be erected at Midland, Pa., estimated to cost $300,000, for which bids will be called on a general contract at an early date. W. G. Eckles, Lawrence Savings & Trust Building, New Castle, Pa., is architect.

The Barry & Zechner Co., East Fulton Street, Lancaster, Pa., manufacturer of machinery and parts, is taking bids until Sept. 10 for the erection of a new two-story machine shop, 60 x 100 ft., estimated to cost $25,000. R. M. Reilly is president. W. P. Erisman, 422 Woolworth Building, is architect.

Manual training equipment will be installed in the proposed three-story junior high school to be erected at Lancaster, Pa., estimated to cost $200,000, for which preliminary plans are being prepared by C. E. Urban, Woolworth Building, architect.

Manual training equipment will be installed in the proposed two-story and basement high school to be erected at Shamokin, Pa., estimated to cost $150,000, for which an

architect will be selected to prepare plans in the near future. The Board of Education is in charge.

The Lebanon Brass Works, Lebanon, Pa., is in the market for a high speed direct-connected polishing and buffing lathe.

Pittsburgh

PITTSBURGH, Sept. 3.

THERE is still a fairly good movement of single tools, but not much action against the lists, on which the trade has been working for several weeks, among them that of the Pennsylvania Railroad, involving 34 tools, for its shops in the Central Region of the system. So far as can be learned, no awards yet have been made against this list. Rolling mill equipment is showing greater activity. Bethlehem Steel Co., recently closed for all the auxiliary equipment for a blooming mill at its Johnstown, Pa. works. A shear, intensifier, gage mill tables and a manipulator went to the Mesta Machine Co., Pittsburgh, while the depressing and runout table and the scale and slab conveyor went to the Wheeling Mold & Foundry Co., Wheeling, W. Va., and the United Engineering & Foundry Co., Pittsburgh, was awarded the shear approach table and manipulator. Jones & Laughlin Steel Corporation is gathering data on drives for a new bar mill and once this matter is definitely settled, formal inquiry will be issued for the mill and several cranes to serve it.

Plans have been filed by the American Steel Band Co., 886 Progress Street, Pittsburgh, for the erection of a new one-story plant on property recently acquired on Nixon Street, estimated to cost $25,000, and for which foundations will be laid at once.

The Penn Public Service Co., Vine Street, Johnstown, Pa., has plans in preparation for the erection of a two-story service and repair building, 56 x 105 ft., on Lind Street, with installation to include a machine shop, for company motor trucks and cars, estimated to cost $75,000. C. J. Lane is company engineer.

The Peerless Sand Co., Oliver Building, Pittsburgh, is planning for the rebuilding of its plant at Cheswick, Pa., destroyed by fire, Aug. 22, with loss estimated at $90,000, including conveying, digging, loading and other kindred machinery, and power equipment.

The Rainey Tool Co., Grove City, Pa., is being organized under State laws to take over and expand the local plant and business of Rainey Brothers, manufacturers of mechanics' tools, operating for about two years past. Increased production is planned. The new company is headed by W. J., F. L. and J. C. Rainey.

A machine shop will be installed in the two-story addition, 25 x 110 ft., to be erected at the service building of the Mervis Garage Co., 414 East Eighth Avenue, Munhall, Pa., estimated to cost $45,000. A. G. Wickerham, 517 McClure Avenue, Homestead, Pa., is architect.

The Shenango Furnace Co., Oliver Building, Pittsburgh, has commenced the rebuilding of the machine shop at its plant at Sharpsville, Pa., recently destroyed by fire with loss of about $50,000.

The Carnegie Steel Co., Carnegie Building, Pittsburgh, will install a stationary gantry crane at the proposed new coke-unloading dock to be constructed at its Mingo Works, on the Ohio River, for which application has been made to the local Federal engineers. Two ice-breakers and other equipment will be installed. The company is also planning for the installation of conveying equipment for barge-loading service at its works at Wilson, Pa.

The West Penn Co., West Penn Building, Pittsburgh, operating electric light and power properties, has arranged for a preferred stock issue of $50,000,000, a portion of the proceeds to be used for extensions and improvements in generating plants and system.

Manual training equipment will be installed in the new two-story and basement high school to be erected at Koppel, Pa., estimated to cost $125,000, for which plans have been prepared by W. G. Eckles, Lawrence Savings and Trust Building, New Castle, Pa., architect.

Manual training equipment will be installed in the proposed new junior high school to be erected at Clarksburg, W. Va., estimated to cost $90,000, for which an architect will be selected to prepare plans at an early date. The Board of Education is in charge.

The Atwood Borough Electric Co., Atwood, Pa., is being organized to install and operate a local electric power and system. A. M. Mitchell and G. E. Murrie head the company, which is represented by McCahill, McCahill & Tabor, 908 West Penn Building, Pittsburgh. The new company will also operate a plant at Dayton, Pa., to be known as the Dayton Borough Electric Corporation.

Detroit

DETROIT, Sept. 3.

CONTRACT has been let by the Woodland Piston Co., Muskegon, Mich., for the erection of the first unit of a new plant on the Lake Shore Drive, to be one-story, 60 x 120 ft., to cost approximately $30,000. It will be equipped for the manufacture of patented sleeve rings for piston service. It is purposed to prepare plans for a second plant unit at an early date.

The National Standard Co., Niles, Mich., manufacturer of railroad jacks, air compressors, etc., is said to be arranging a list of equipment for installation at its proposed new plant at Akron, Ohio, for which property recently was acquired.

The Cadillac Motor Car Co., 2060 Clark Street, Detroit, has engaged the Austin Co., 1954 Penobscot Building, to prepare plans and construct the proposed new foundry additions at its plant, on site at Clark Street and Scotten Avenue, estimated to cost $500,000, with machinery.

The Schoonmaker Motor Truck Co., Hudson, Mich., recently organized, has perfected its organization, with W. N. Derbyshire as president, and purposes to operate a local plant for the manufacture of commercial trucks and parts, for which plans will be consummated at an early date. Walter Eberly, mayor of the city, will be a director of the new company, as will G. C. Lowe, also of Hudson.

The Hudson Motor Car Co., Jefferson Avenue, Detroit, has awarded a general contract to the Brayton Engineering Co., 6500 Epworth Boulevard, for the erection of a one-story addition, 65 x 280 ft., on Conners Avenue, estimated to cost $100,000, including equipment.

The Ford Motor Co., Highland Park, Mich., has preliminary plans in preparation for the erection of a new one-story foundry at its River Rouge, Mich., plant, 600 x 1800 ft., estimated to cost $650,000. Plans are also in progress for the construction of a new coal by-products plant at the same works, to cost in excess of $500,000, with machinery. Albert Kahn, 1000 Marquette Building, Detroit, is architect for both projects.

The Peninsular Power Co., North Carroll Street, Madison, Wis., is completing plans for the initial unit of its proposed electric generating plant at Iron River, Mich., estimated to cost $250,000, and will arrange for the equipment installation at an early date. Mead & Seastone, Journal Building, Madison, Wis., are engineers.

W. A. Klein, Lapeer, Mich., formerly located at Columbiaville, Mich., is organizing a local company to establish and operate plant for the manufacture of a line of metal products. Space has been leased in the Krolick building, and it is purposed to install equipment at an early date, having the plant ready for service before the close of September.

Buffalo

BUFFALO, Sept. 3.

WORK will commence on the erection of an addition to the foundry of the American Brass Co., Military Road, Buffalo, including remodeling and improvements in present building, and the installation of electric casting and other machinery, estimated to cost $700,000.

A machine shop, with lathe, drill press and other tools, will be installed in the two-story and basement automobile service building, 60 x 140 ft., to be erected at Niagara Street and Hertel Avenue, Buffalo, by W. H. Linford, address noted, estimated to cost $85,000. G. Morton Wolfe, 1377 Main Street, is architect.

The American La France Fire Engine Co., Elmira, N. Y., manufacturer of motor-driven fire equipment, has plans for the erection of a new two-story addition, estimated to cost $80,000.

The Rochester Gas & Electric Co., Rochester, N. Y., has tentative plans for the construction of a new power dam and hydroelectric generating plant on the Genesee River, near Mount Morris, N. Y., estimated to cost $6,500,000.

The Penn Yan Boat Co., Penn Yan, N. Y., is having plans drawn for the construction of a two-story addition to its boat-building plant on Liberty Street, for mechanical and repair work, etc., estimated to cost $60,000. C. A. Herman is one of the heads of the company.

A merger has been arranged between the Rochester Forge Co., Rochester, N. Y., and the Burke Steel Co., Inc., with local plant at 85 Mortimer Street, under the last noted name. Extensions and improvements are planned.

Crane-Schiefer-Owens, Inc., Buffalo, recently organized, will succeed to and expand the business of the Crane Machinery Co. Branches will be operated at Rochester and Syracuse, N. Y.

The Standard Table Co., 92 Steele Street, Jamestown, N. Y., is said to be arranging a list of equipment for installation at its plant, including lathes, spraying machines, woodworking tools and transmission equipment. L. G. Cowing is secretary.

The Board of Public Utilities, Jamestown, N. Y., is planning for the installation of electrically-operated pumping machinery in connection with extensions and improvements in the municipal waterworks, for which a bond issue of $280,000 is being arranged.

Fire, Aug. 28, destroyed the machine and repair shop and other portions of the automobile service building of the Colton Garage Co., Medina, N. Y., near Park Avenue, with loss estimated at $45,000. It is planned to rebuild.

The Common Council, Churchville, N. Y., plans for the installation of electrically-operated pumping machinery in connection with the installation of a new waterworks plant and system, estimated to cost $80,000. R. E. Gaskin, 207 Cutler Building, Rochester, N. Y., is engineer.

Conveying and elevating machinery, electric power and other mechanical equipment will be installed in the eight-story and basement warehouse, 80 x 155 ft., to be erected at Mount Hope Avenue and Fourth Street, Rochester, N. Y., by the Rochester Carting Co., 162-64 Andres Street, estimated to cost $1,000,000, with equipment. Gordon & Kaelber, 125 Sibley Block, are architects.

Chicago

CHICAGO, Sept. 3.

THE market has relapsed into a condition of extreme quiet. Machine tool dealers have booked few orders during the week and inquiries have declined sharply. Industries are not showing much interest in new equipment at the moment, but selling organizations are hopeful for a revival of activity as soon as manufacturing plants feel the full force of fall seasonal business. Encouragement is derived from the fact that certain industrials already report a substantial increase in their orders over bookings in the summer months. Railroad buying, which has been the mainstay of the machine tool market during the past three months, is at a low ebb. The Santa Fé and the Union Pacific have decided to make no further purchases until the new year. The Burlington list is still pending and action on it will probably not be taken for a month or two.

The Brainerd Foundry Co., Brainerd, Minn., recently incorporated, is constructing a foundry, 30 x 80 ft., for the manufacture of gray iron, brass and crucible steel castings. Purchases of equipment have not yet been made. Officers are C. E. Parker, president and treasurer; E. O. Webb, vice-president; and F. E. Kinsmiller, general manager and secretary.

The American Car & Foundry Co., Railway Exchange Building, Chicago, has purchased a 10-acre tract between the south branch of the Chicago River and the Chicago, Burlington & Quincy Railroad, just east of Canal C, adjoining the company's present tool plant. The new acquisition will be used eventually as the site for a new freight car works, although there are said to be no immediate plans for its construction.

The Wisconsin Steel Works, 10871 Torrence Avenue, Chicago, has let a contract for a one-story machine shop, to cost $23,000.

Fire seriously damaged the plant of the Lincoln Brass & Spinning Works, 3262 Grand Avenue, Chicago, Aug. 24.

The Daniel Boone Woolen Mills Co., 1735 Diversey Parkway, Chicago, will erect a factory and woolen mills at Davenport, Iowa. The building will cost $75,000 and the equipment $200,000.

The Belle City Malleable Iron Co. Racine, Wis., will erect a foundry addition at Kewaunee and Albert Streets, to cost $100,000.

The Wabash Railroad Co., St. Louis, has awarded a general contract to Townsend B. Smith, Gushard Building, Decatur, Ill., for the erection of an addition to its local locomotive repair shops, Seventh Street, estimated to cost $175,000, including equipment. A. O. Cunningham is chief engineer.

The Service Oil Co., 322 Hamm Building, St. Paul, Minn., has plans in preparation for the erection of a three-story oil storage and distributing plant on the line of the Chicago, Milwaukee & St. Paul Railroad Co., estimated to cost $150,000, including equipment.

The Wisconsin Steel Works, 106th Street and Torrence Avenue, Chicago, has filed plans for the erection of a new one-story shop addition, 40 x 128 ft., estimated to cost $25,000, and will commence work at once.

Manual training equipment will be installed in the new three-story and basement junior high school to be erected at Council Bluffs, Iowa, estimated to cost $250,000, for which bids will be received on a general contract until Sept. 12. J. C. Jensen, 2534 Avenue B, is architect.

The Watson Co., 520 Brown Block, Rockford, Ill., G. Watson, head, has inquiries out for a drill press, air compressor and other equpiment for local machine shop service.

The Goss Printing Press Co., 1535 South Paulina Street, Chicago, is taking bids on a general contract for the erection of a new plant at Wood Street and Fifteenth Place, 100 x 500 ft., estimated to cost $275,000, including machinery. R. G. Schmidt & Co., 7 West Washington Street, are architects.

The Milwaukee Electric Railway & Light Co., Milwaukee, Wis., is disposing of a bond issue of $10,000,000, a portion of the proceeds to be used for extensions and improvements. John I. Beggs is president.

Manual training equipment will be installed in the new two-story high school to be erected at Bartley, Neb., estimated to cost $100,000, for which foundations will be laid at once. R. A. Bradley & Co., Scottsbluff, Neb., are architects.

A one-story automobile service building, 80 x 200 ft., for company motor trucks and cars, will be erected on Lake Park Avenue, near Twenty-fourth Street, Chicago, by the Hydrox Beverage & Ice Cream Co., Lake Park Avenue, estimated to cost $50,000. A machine shop, with lathe, cylinder grinder and other equipment will be installed.

The Polar Wave Ice & Fuel Co., 3626 Olive Street, St. Louis, has tentative plans for the erection of a new plant along the line of the Wabash Railroad at Decatur, Ill., 100 x 200 ft., estimated to cost $175,000, including machinery.

The Pacific Coast

SAN FRANCISCO, Aug. 28.

BIDS will soon be asked for the erection of a two-story addition to the plant of the Pelton Water Wheel Co., Nineteenth, Florida and Alabama Streets, San Francisco, estimated to cost $100,000, including machinery. W. W. Hanscom, 848 Clayton Street, is engineer.

Ovens, power equipment, conveying machinery and other mechanical equipment will be installed in the new baking plant to be erected in the Beverly Hills section, by the Holsum Baking Co., 1802 Hooper Street, Los Angeles, estimated to cost $115,000, with machinery.

Out of an initial appropriation of $10,462,339 for extensions and improvements in power plants and system, the Los Angeles Gas & Electric Co., South Hill Street, Los Angeles, has an available fund of $4,500,000, and plans to use a portion of the amount for further additions and machinery installations at an early date.

Paul Mosedian & Co., Zante (Tulare County), Cal., has plans under way for the construction of a new ice-manufacturing and cold storage plant, estimated to cost $60,000.

The American Can Co., Seattle, Wash., has plans in preparation for the construction of a four-story addition to its local plant on Clay Street, to cost close to $200,000, with equipment. R. A. Gillespie is plant superintendent.

The Bratlie Brothers Mill Co., Ridgefield, Wash., will rebuild its local lumber plant, recently destroyed by fire, on a larger scale, installing additional machinery for considerable increase in capacity. The fire loss, estimated at $100,000, will be exceeded by more than one-half in the rebuilding expenditure. Electric power equipment will be installed for machinery operation.

The Great Western Smelting & Refining Co., 75 Folsom Street, San Francisco, has plans out for bids for the erection of its proposed one-story foundry, 138 x 275 ft., at Spear and Folsom Streets, estimated to cost $75,000. Excavations will soon be placed in progress. Morrow & Garrien, Chronicle Building, are architects.

The Mergenthaler Linotype Co., 130-36 West Montgomery Street, San Francisco, will commence the erection of a three-story and basement addition, to cost in excess of $80,000. A. A. Cantin, 58 Post Street, is architect.

The Los Angeles Mfg. Co., 2500 Leonard Street, Los Angeles, manufacturer of riveted steel well casing and water pipe, steel tanks, etc., has awarded a contract to J. S. Fluor, Santa Ana, Cal., for the erection of a one-story addition, 100 x 100 ft.

The Superior Iron Co., Lodi, Cal., formerly known as the Superior Mfg. Co., will develop its local plant for the manufacture of pumping machinery for mining service and other mining machinery. Otto Spenker is president.

The Barton-Brown Engineering Co., 1111 Santa Fe Avenue, Los Angeles, has awarded a contract to V. P. Gilbert, Citizens National Bank Building, for the erection of a one-story mechanical shop, 50 x 60 ft.

A manual training department will be installed in the proposed new junior high school to be erected at Eureka, Cal., for which a bond issue of $500,000, is being arranged. The Board of Education will soon select an architect to prepare plans.

A power house will be erected by the American Laundry Co., 3338 Seventeenth Street, San Francisco, in connection with its proposed new mechanical laundry plant, estimated to cost $100,000, with equipment. Shea & Shea, Chronicle Building, are architects.

Allen R. Moore, Mount Vernon, Wash., and associates, are perfecting plans for the construction of a hydroelectric generating plant on Swift Creek, a branch of the Baker River, estimated to cost $100,000. Application for permission has been made to the state engineer.

Milwaukee

MILWAUKEE, Sept. 3.

SEPTEMBER prospects for the machine-tool trade are considered brighter than those at the beginning of any month since May. Inquiry, which has been improving for several weeks, was increasingly active in the last week of August. Automotive industries appeared as the main source of inquiry, and while no lots of size were involved, a fair aggregate is represented. Sales, while by no means brisk, show betterment. General industries are maintaining a steady employment and production and are buying tools in a small way against urgent needs rather than to increase capacity.

The Milwaukee Electric Railway & Light Co., Public Service Building, Milwaukee, let the general contract to Paul W. Bringe Co., 940 Third Street, local, for a brick and reinforced concrete addition, 50 x 71 ft., to the boiler house of the Oneida Street steam generating plant, Edison Avenue and Oneida Street. The contract for a two-story sub-station, 35 x 55 ft., at North Milwaukee, has been let to the Dahlman Construction Co., 221 Grand Avenue, local. Equipment is now being purchased. S. B. Way is vice-president and Fred H. Luber is architect.

The Cobb Canning Co., Cobb, Wis., has let contracts for the erection of a $100,000 vegetable preserving plant with a separate steam generating plant, 42 x 40 ft., to be ready early in 1924. Purchases of equipment, including two 100-hp. boilers, 300-400-kw. generator, electric motors and special canning factory machinery probably will not be made until November or January. Henry Terens is secretary and general manager.

The Glancy Malleable Corporation, Waukesha, Wis., is a new Wisconsin company organized with a nominal capital of 1000 common shares having no par value, to manufacture malleable castings, machinery, tools, etc. While nothing definite concerning its plans will be announced until later, it is reported that the new concern intends to take over a local foundry now operated under lease by a large automotive interest. The incorporators are P. T. E. Ward, L. A. Avery and M. P. Hocking.

The Triumph Stove & Heater Co., now occupying leased quarters at Forty-ninth and State Streets, town of Wauwatosa, is concluding negotiations with the Chamber of Commerce, Appleton, Wis., with a view of relocating the plant and offices. A suitable building is available which would permit of an increase of from 250 to 300 per cent in the present capacity. Herman Klein is president and general manager.

The New Silent Washer Co., Clintonville, Wis., has been incorporated with a capital stock of $30,000 to take over the assets of the former Silent Washer Co., rehabilitate its plant and resume the manufacture of power-driven washing machines. The new owners include J. H. Spearbraker, Henry Kuth, T. L. Teleson and D. T. Robser, all of Clintonville.

The Racine Investment Co., Racine, Wis., has plans by Edmund B. Funston & Co., architects, for a $50,000 garage, sales and service building, 82 x 120 ft., two stories and basement, at 401-407 Lake Avenue. Bids will be taken after Sept. 10 or 15. The identity of the occupant is withheld for the present.

The Board of Education, New London, Wis., expects to select designs and appoint an architect Sept. 15 to plan the proposed new high school, foundations of which are to be laid this fall and the building completed next spring. It will cost $250,000 and contain a vocational training department. R. J. McMahon is city superintendent of schools.

The Texas Co., 209 Jackson Street, Milwaukee, will build a branch refinery, warehouse, power plant, tank storage and office building in West Milwaukee, Wis., at an estimated cost of $65,000. Bids will be taken about Sept. 10 by J. L. Daniels, 1350 McCormick Building, Chicago.

The Milwaukee Central Board of Purchases, City Hall, is asking bids until Sept. 7 for furnishing a complete boiler makeup water purification plant to the Riverside pumping station of the municipal water works system. Joseph W. Nicholson is chief buyer.

The Grimm Aluminum Casting Co., Manitowoc, Wis., let the general contract to Matt. S. Dempsey, 1911 Marshall Street, local, for erecting a brick and steel foundry building 60 x 150 ft., at Twenty-first and Franklin Streets. The investment in buildings and equipment will be about $50,000. The architect is W. J. Raeuber.

Indiana

INDIANAPOLIS, Sept. 3.

MANUAL training equipment will be installed in the new two-story high school to be erected at Sullivan, Ind., estimated to cost $150,000, for which bids will be asked on a general contract about Sept. 15. J. P. Bayard, 231½ Main Street, Vincennes, Ind., is architect.

A machine shop will be installed in the one-story and basement service building, 40 x 130 ft., to be erected at Nineteenth and Columbia Streets, Lafayette, Ind., by the J. F. Horner Automobile Co., Sixth and Columbia Streets, estimated to cost $35,000, exclusive of equipment. A drill press, lathe, hand tools, etc., will be installed.

Manual training equipment will be installed in the new two-story and basement high school to be erected at Greenfield, Ind., estimated to cost $110,000, for which plans are being prepared by O. P. Gordon, 412 Mechanic Street, architect.

The Board of Trustees, Purdue University, West Lafayette Ind., is planning to issue an early call for bids for the erection of a new one-story and basement electrical equipment and instruction building at the institution, estimated to cost $100,000, with machinery. Nicol, Scholer & Hoffman, 308 Main Street, Lafayette, Ind., are architects.

A machine shop, with lathe, drill press and other equipment will be installed in the one-story and basement automobile service building 80 x 95 ft., to be erected at Princeton, Ind., by the E. Robinson Co., on South Main Street, to cost about $30,000, exclusive of equipment. Osterhage & Sutton, Citizens Bank Building, Vincennes, Ind., are architects.

Cincinnati

CINCINNATI, Sept. 3.

THOUGH orders are somewhat scattered, inquiries are more numerous, and prospects for business are considered to be much improved over those of a month ago. No large lists are coming out, the requests for prices being from manufacturers who desire to buy from one to three machines. At least two manufacturers, in the automotive field, are expected to buy a large number of machine tools in the near future, and it is expected that railroad buying will be resumed shortly after the first of October. Orders during the week include that of the Allis-Chalmers Mfg. Co., which bought six machines for its West Allis and Cincinnati plants. The U. S. Engineers office at Portland, Ore., placed four large engine lathes, and the Norfolk & Western Railroad purchased drilling machinery recently inquired for.

The J. H. Day Co., Cincinnati, manufacturer of baking, paint, and special machinery, has purchased 10 acres of land in the Bond Hill section. There are no immediate plans for improvement of the property, the site being purchased with a view to future expansion.

The plant of the Walter L. Lille Co., Columbus, Ohio, manufacturer of woodwork, which was destroyed by fire Aug. 23, will not be rebuilt.

The International Harvester Co., which is building a new plant at Fort Wayne, Ind., is understood to have completed plans for the manufacture of the larger automobile trucks, now being carried on at Akron, Ohio., in the new plant. Production of the light truck will be continued at the Springfield, Ohio, plant. The company is now producing 35 light trucks daily, and is reported to have sufficient orders booked to maintain this rate for the rest of the year.

The foundry of the Indiana Reformatory, Jeffersonville, Ind., has been closed, pending the completion of the new building at Pendelton, Ind., which will be equipped with modern machinery. The old buildings have been sold to Colgate & Co., soap manufacturers.

The Columbus Machine Works, Columbus, Ind., has been sold to a group of Crothersville, Ind., business men, and the plant of the company will be moved to that city. W. P. Rider has been elected president of the company, and H. C. Deist secretary-treasurer.

The Wellston Mfg. Co., Wellston, Ohio, has broken ground for an addition to its machine shop. The company will install some new equipment, including a 5-ton electric traveling crane.

The American Railway Equipment Co., Dayton, Ohio, has been organized to manufacture and market a machine for registering fares and printing transfers for street car lines. The company is now being financed, and will shortly announce the location of its plant. C. B. Fisher heads the company.

The Gulf States

BIRMINGHAM, Ala., Sept. 3.

CHARLES E. NAVEK, Gulfport, Miss., engineer, has inquiries out for drilling, stamping and polishing aluminum products, for installation in a local plant.

The Southern Utilities Co., St. Augustine, Fla., has plans for enlargements in its local electric power plant, to include the installation of a new 1500 kw. turbo-generator and auxiliary machinery, including boilers, stokers, condenser and switchboard.

Manual training equipment will be installed in the new high school to be erected at Floydada, Tex., estimated to cost $100,000, for which work has been placed in progress. The Board of Education is in charge.

A machine shop, with lathe, drill press, cylinder grinder and other equipment will be installed in the new one-story service building, 115 x 135 ft., to be erected by the Oliver Motor Co., West Palm Beach, Fla., at Third Street and Railroad Avenue, estimated to cost about $65,000, exclusive of equipment.

Manual training equipment will be installed in the new three-story high school to be erected at Oak Cliff, Dallas, Tex., estimated to cost $500,000, for which bids will be asked on a general contract early in October. DeWitt & Lemon, Dallas, are architects.

The Eureka Foundry Co., North Sixth Street, Gadsden, Ala., has preliminary plans for enlargements in its plant for the production of iron and steel castings, including the installation of additional equipment. E. J. Owen is president.

H. W. Dexter, in the machinery and mill equipment business, Bisbee Building (P. O. Box 665), Jacksonville, Fla., is in the market for a 50-hp. gasoline, crude oil or kerosene oil engine to operate a sand pump; also 2000 ft. of 8-in. I-beams for monorail trolley usage and 500 ft. of 8-in. spiral riveted pipe for the sand pump.

Cleveland

CLEVELAND, Sept. 3.

WITH the issuance of a number of good inquiries, the improvement in the machine tool market noted last week is still in evidence. The Ford Motor Co. is again an active buyer, and some business is in prospect from other Detroit automobile companies. The Ford company is understood to have placed orders for considerable equipment during the past two weeks and has some other machinery inquiries pending. New inquiries involving considerable equipment have come out from the American Steel & Wire Co. for its Trenton, N. J. plant and from the Westinghouse Air Brake Co., Pittsburgh. The Nickel Plate Railroad, which issued a list of about 15 machines early in the summer, but which deferred buying, is now planning to place this equipment within the next week or two. Business with local dealers continues quiet. Sales are limited mostly to single machines and little new inquiry is pending.

The Erie Railroad will enlarge its ore handling capacity in Cleveland and has placed an order with the Wellman-Seaver-Morgan Co. for a 15-ton Hulett unloader. The latter company has also taken a contract from the Adirondack Light & Power Corporation, Schenectady, N. Y., for two 15,000-hp. hydraulic turbines, and another contract from the Northern New York Utilities Corporation for a 4000-hp. turbine for its Flat Rock plant.

The Metropolitan Steel Co., Youngstown, Ohio, has been organized to manufacture all-steel refrigerators and has purchased from the Austin Co., Cleveland, a manufacturing plant located at Mineral Ridge, Ohio. Considerable new equipment will be installed. The company has been incorporated with a capital stock of $350,000. A. H. Dillon is president, S. A. Walker, vice-president and general manager, and W. F. Pettingill, secretary and treasurer.

The Norwalk Enamel Product Co., Norwalk, Ohio., has been organized to manufacture various enamel products, including signs, electrical equipment, stove parts, and other flat ware products. The company has been incorporated with a capital stock of $510,000, and plans to build a new plant shortly. Fred W. Cook is president, Thomas E. Adkins, vice-president, Frank Dudley, secretary, and E. W. Taylor, treasurer.

The Buckeye Castings Co., Lima, Ohio, will increase its capital stock by the issue of $25,000 in common shares in order to provide for plant expansion.

The Packard Electric Co., Warren, Ohio, will enlarge its plant by the erection of a two-story factory building, 110 x 220 ft., and will also build a new power house.

The New Cumberland Glass Works, New Cumberland, West Virginia, plans shortly to begin the erection of a new plant to replace one that was recently burned.

The Martin-Perry Co., manufacturer of bodies for motor trucks will establish a branch plant in Toledo, Ohio, having leased a portion of the plant formerly operated by the Milburn Wagon Co. that was recently purchased by the General Motors Corporation.

The National Standard Co., Niles, Mich., has purchased a factory building, 60 x 200 ft., in Akron, Ohio, which it will equip for the manufacture of automobile and railroad jacks and air compressors. W. E. Parkin is secretary-treasurer.

The H. B. Freeman Co., Lima, Ohio, was recently organized to deal in steel sash, metal lath, and other building equipment. H. B. Freeman is president. The Galion Iron & Mfg. Co., Galion, Ohio, is having plans prepared for a one-story factory building 50 by 100 ft.

The Central South

ST. LOUIS, Sept. 3.

PLANS are being perfected by the Dixie Consilidated Graphite Co., Birmingham, Ala., for the construction of a new plant on site selected at Chattanooga, Tenn., to include a power house and machine shop, in conjunction with main manufacturing plant, estimated to cost $250,000, including machinery. C. E. Watson is president.

The National Metal Trades Association, 414 Odd Fellows Building, St. Louis, has inquiries out for a drill press, medium size, for installation in its metal-working instruction shop.

The Keltner Mining Co., Picher, Okla., has tentative plans for the rebuilding of the portion of its mill and power house, recently destroyed by fire with loss estimated at $100,000, including machinery.

The Department of State Institutions, Nashville, Tenn., Lewis S. Pope, commissioner, will commence the erection of a new power plant in connection with other buildings at the Deaf and Dumb School on the Island Home property, Knoxville, Tenn., to cost in excess of $350,000. Marr & Holman, Nashville, and Barber & McMurray, Knoxville, are associated architects.

The West Side Garage, 900 West Douglas Avenue, Wichita, Kan., is planning for the purchase of a lathe and other equipment for installation in its machine shop.

Manual training equipment will be installed in the new two-story junior high school to be erected at Iola, Kan., estimated to cost $150,000, for which bids will be received on a general contract until Sept. 17. T. W. Williamson & Co., Central National Bank Building, Topeka, Kan., are architects.

The Oil Products Co., Inc., Fifth and Jefferson Streets, Lexington, Ky., is planning for the installation of additional rotary pumping machinery at its plant, to provide for about 3000 gals. capacity. A new addition, 25 x 80 ft., will be constructed. Stanhope Wiedman, P. O. Box 473, is president and general manager.

Negotiations are under way by O. H. Hyde and L. R. Gifford for the purchase of the plant and business of the Buffum Tool Co., Louisiana, Mo. The new owners propose to reorganize the company and install additional equipment at the plant. The same interests are also arranging for the local plant of the Louisiana Sash & Door Co., and will operate in conjunction with the tool works. Extensions will be made and additional machinery installed.

The Board of Commissioners, McAlester, Okla., will take bids until Sept. 18, for two 1400-gal. per minute capacity duplex power pumps, and two like capacity centrifugal pumps, for installation at the municipal waterworks. E. T. Archer & Co., New England Building, Kansas City, Mo., are engineers.

A machine shop will be installed in the new two-story automobile service building to be erected at 291 Union Avenue, Memphis, Tenn., by the Graham-Merrin Co., estimated to cost $60,000, exclusive of equipment. E. L. Harrison, Memphis, is architect.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	3.54c.
Swedish charcoal iron bars, base	7.50c.
Soft steel bars, base price	3.54c.
Hoops, base price	5.19c.
Bands, base price	4.39c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger, base	3.64c.
Channels, angles and tees under 3 in. x ¼ in. base	3.54c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.60c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	4.10c.
Toe-calk, ½ x ⅜ in. and larger	4.60c.
Cold-rolled strip, soft and quarter hard	7.50c. to 8.50c.
Open-hearth, spring-steel	5.00c. to 7.50c.
Shafting and Screw Stock:	
Rounds	4.65c.
Squares, flats and hex	5.15c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High speed steel, 18 per cent tungsten	75c. to 80c.

Tank Plates—Steel

¼ in. and heavier	3.64c.

Sheets

Blue Annealed

	Per Lb.
No. 10	4.59c.
No. 12	4.64c.
No. 14	4.69c.
No. 16	4.79c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.55c. to 4.80c.	.....
Nos. 22 and 24	4.60c. to 4.85c.	5.10c.
No. 26	4.65c. to 4.90c.	5.15c.
No. 28	4.75c. to 5.00c.	5.25c.
No. 30	4.95c. to 5.20c.	.....

No. 28 and lighter, 36 in. wide, 20c. higher.

Galvanized

	Per Lb.
No. 14	4.85c. to 5.10c.
No. 16	5.00c. to 5.25c.
Nos. 18 and 20	5.15c. to 5.40c.
Nos. 22 and 24	5.30c. to 5.45c.
No. 26	5.45c. to 5.70c.
No. 27	5.60c. to 5.85c.
No. 28	5.75c. to 6.00c.
No. 30	6.20c. to 6.50c.

No. 28 and lighter, 36-in. wide, 20c. higher.

Welded Pipe

Standard Steel			*Wrought Iron*		
	Black	Galv.		Black	Galv.
½ in. Butt...	—41	—24	½ in. Butt...	— 4	+19
¾ in. Butt...	—46	—32	¾ in. Butt...	—11	+ 9
1-3 in. Butt..	—48	—34	1-1½ in. Butt.	—14	+ 6
2½-6 in. Lap.	—44	—30	2 in. Lap	— 5	+14
7-8 in. Lap...	—41	—11	2½-6 in. Lap.	— 9	+ 9
9-12 in. Lap.	—34	— 6	7-12 in. Lap..	— 3	+16

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	5.00c.
Annealed soft	5.00c.
Galvanized annealed	5.65c.
Coppered basic	5.65c.
Tinned soft Bessemer	6.65c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	18½c. to 19½c.
High brass wire	19 c. to 20 c.
Brass rods	16¾c. to 17¾c.
Brass tube, brazed	26½c. to 27½c.
Brass tube, seamless	24 c. to 25 c.
Copper tube, seamless	25½c. to 26½c.

Copper Sheets

Sheet copper, hot rolled, 21¾c. to 22¾c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14 x 20		
	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20		Prime	Seconds
			80 lb.	$6.55	$6.30
			90 lb.	6.65	6.40
			100 lb.	6.75	6.50
IC	$11.75	$10.50	IC	7.00	6.75
IX	13.00	11.75	IX	8.25	8.00
IXX	14.75	13.00	IXX	9.50	9.25
IXXX	16.50	14.75	IXXX	10.75	10.50
IXXXX	18.50	16.50	IXXXX	12.00	10.75

Terne Plates

8 lb. coating, 14 x 20

100 lb.	$7.00 to $8.00
IC	7.25 to 8.25
IX	8.25 to 8.75
Fire door stock	9.00 to 10.00

Tin

Straits pig	43c.
Bar	48c. to 55c.

Copper

Lake ingot	16¾c.
Electrolytic	16¼c.
Casting	16 c.

Spelter and Sheet Zinc

Western spelter	7½c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead	8⅛c. to 8½c.
Bar lead	11c. to 12c.
Solder, ½ and ½ guaranteed	29c.
No. 1 solder	27c.
Refined solder	23c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb	75c. to 90c.
Commercial grade, per lb	35c. to 50c.
Grade D, per lb	25c. to 35c.

Antimony

Asiatic	9c. to 9½c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb	32c. to 33c.

Old Metals

Business is very quiet and values are lower except for white metals, which are firm. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	11.75
Copper, heavy wire	11.25
Copper, light bottoms	9.50
Brass, heavy	6.00
Brass, light	5.00
Heavy machine composition	8.75
No. 1 yellow brass turnings	6.25
No. 1 red brass or composition turnings	7.75
Lead, heavy	5.75
Lead, tea	4.50
Zinc	4.25
Cast aluminum	15.00
Sheet aluminum	15.00